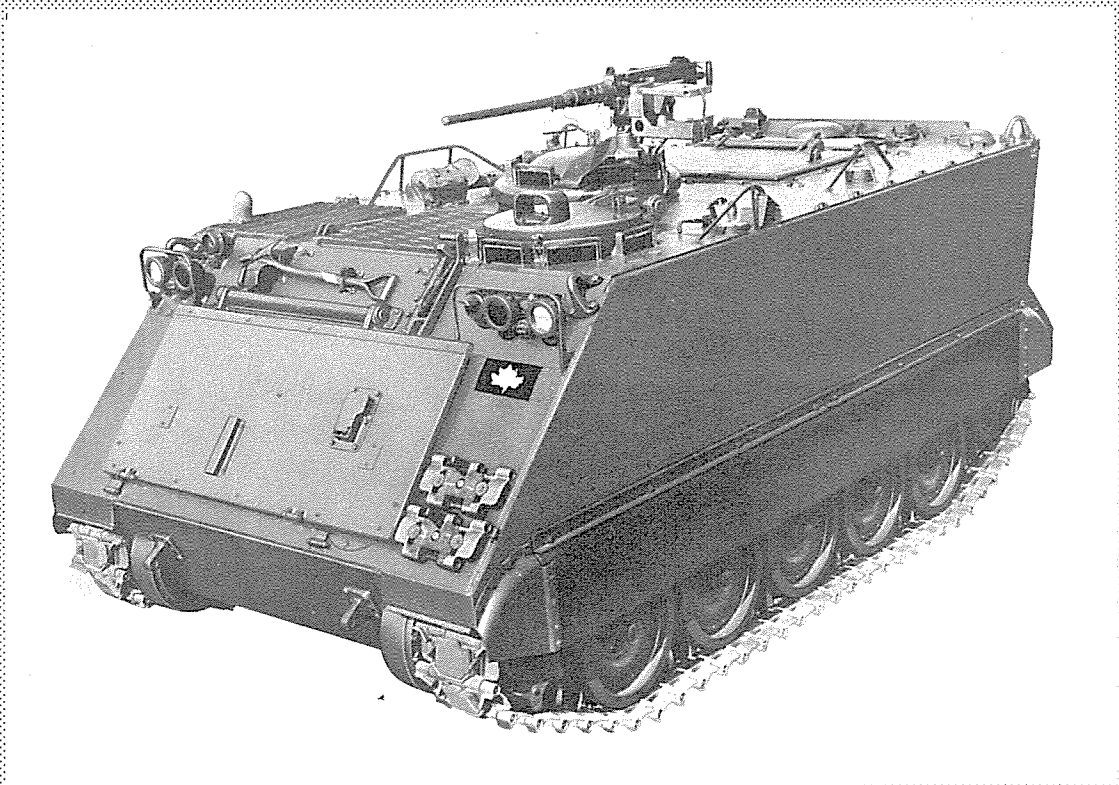
RCEME TECHNICAL BULLETIN



Volume 9, Number 3 July 1964

This Bulletin is published and distributed by the Director of Electrical and Mechanical Engineering as a means of periodically disseminating information on technical matters, current and future Corps policy, and items of general interest to the Corps of RCEME. It is not to be considered as authority for any action. Its contents should be made known to all interested RCEME personnel.

DEADLINE FOR NEXT TWO ISSUES

OCT 15 for OCT ISSUE

DEC 15 for JAN 1965

RCEME TECHNICAL BULLETIN

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COVER: First deliveries of this new equipment, the CH-113A (Boeing-Vertol), and the Armoured Personnel Carrier, M113A1, will go to RCEME for training. Both are expected in Sep-Oct 1964.

DIRECTOR'S PRIZE ESSAY COMPETITION

S sgt P Johnson, DEME, has been judged the winner. His essay "The Case for the Craftsman" will be published in the October issue of the Bulletin.

This publication is issued under the authority of Col A Mendelsohn, CD, Director of Electrical and Mechanical Engineering. The contents have been edited and approved by Lt Col CMR Elmsley, CD.

The Bulletin is published to assist RCEME personnel in keeping abreast of current trends and developments and to circulate interesting news about the Corps. The information and statements herein are not to be quoted as authority for action.

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EDITORIAL

This statement was given to Army Commanders by Lieut.-General G. Walsh, CBE, DSO, CD, Chief of the General Staff, when the White Paper on Defence was issued.

The White Paper on Defence was tabled in the House of Commons on 26 March 1964 providing the basis for a 10-year plan for defence. I would like to put on record my views on the impact of this plan on the immediate and long-range future of the Army.

The tasks and the aims of the Canadian Army will remain the same. The proposed reorganization will give us greater flexibility to meet changing conditions and unforeseen commitments. The brigade in Germany will be improved with new equipment and readjustments in some of the supporting arms. Two of the brigades in Canada will remain on the same establishment as the brigade in Germany to provide rotational troops and will be re-equipped to take advantage of the increased air transport capabilities of the Royal Canadian Air Force for rapid reinforcement wherever required.

One of the brigades will be reorganized as a special service force with emphasis on airportability and airdrop capability, and will be trained for operations in all types of environment. With the advent of the White Paper and the availability of new equipment, fast progress will be achieved. Plans for readjustment of personnel are in hand. Senior commanders will be kept fully informed on the progress being made in periodic liaison letters.

It is unlikely that integration will have an immediate effect on field units. As set out in the White Paper, integration will commence at the highest level once the necessary legislation has been passed in Parliament, and is aimed at reducing the overhead taken up in the administration of the three services. Unified defence planning will emphasize the national entity of our defence force, eliminate the duplication of services, and ensure that there is no vacuum in overall policy planning.

I believe this reorganization will provide us with a much better manpower/equipment ratio, better utilization of manpower, and greater flexibility of maintaining field units at proper establishments. It will also provide interesting career prospects while allowing for a greater dollar effectiveness for the Army as a whole.

I am convinced that the long-term advantages will far outweigh the difficulties which may

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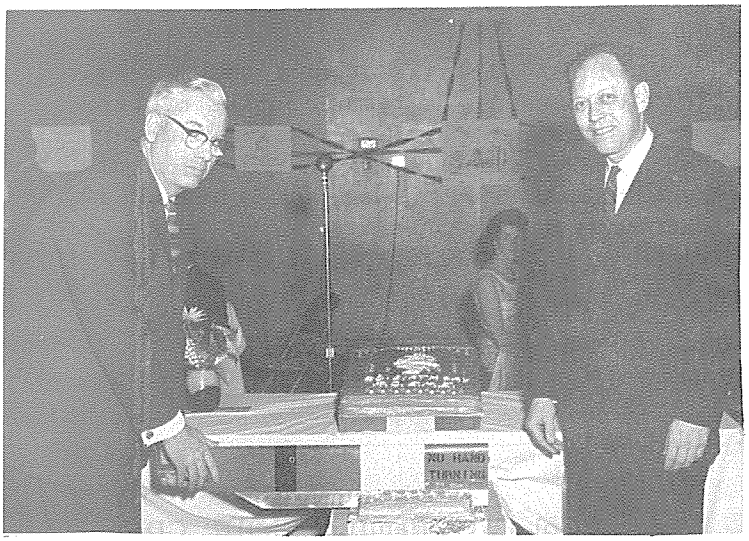
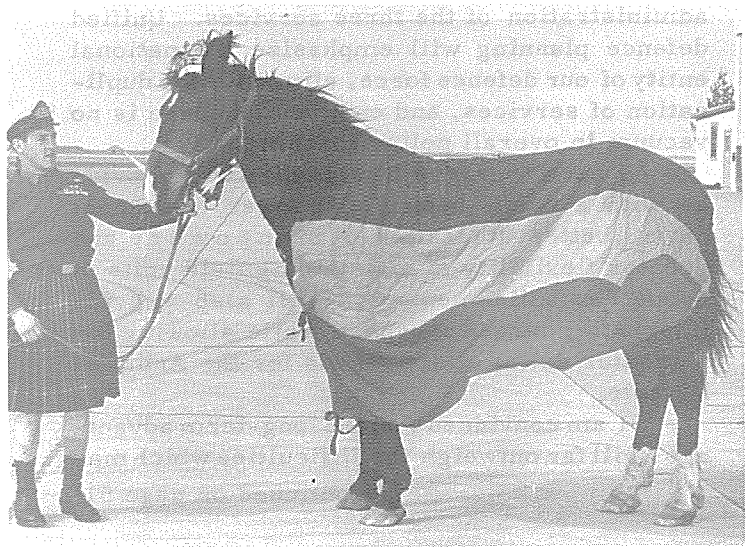




RCEME CJATC

RCEME 20TH ANNIVERSARY CELEBRATIONS AT CJATC

By Sgt RR Gibson

RCEME DAY - 15 MAY! This is the way it was declared on Unit Part 1 Orders at CJATC, Rivers Camp, and by the end of the day there was no doubt left in the minds of the other corps and services that this is exactly what it was. The day began with the raising of the Corps flag on the flagstaff in front of Station HQ, in company with the White Ensign, the Red Ensign and the RCAF Ensign normally flown at this Tri-Service station.

To make absolutely certain that no one could ignore the fact that 196 RCEME personnel were in their midst, a parade organized by the Army Aircraft Maintenance Wing left No 1 Hangar at 1000 hours, proceeding through the camp and PMQ areas. The parade featured a platoon of marching troops, a 12-piece band comprising RCEME personnel only, floats and a special feature. CJATC being a Tri-Service unit, it was considered appropriate that the parade should include the first 'integrated serviceman'. Cfn PP Cyr, dressed in para-troop boots, kilt, RCAF tunic and RCN cap, led a horse decked out in gilded crown, lightning flash bit and a blanket of crimson, gold and blue.

Top	Cutting of RCASC cake by 'RCEME convert' WO 2 Hill and Major Haggins
Center	Cutting of RCEME cake by S/L Stark and S sgt Sturley
Bottom	Cfn Cyr and the horse 'un' forcine

BIRTHDAY RIVERS

The afternoon found all ranks on the sports field participating in softball and horseshoe pitching.

The day was suitably closed with a gala dance in the Recreation Centre with an attendance of over 300. The honour of cutting the traditional birthday cake was extended to Squadron Leader ED Stark, the Senior Aircraft Engineering Officer at CJATC. S/L Stark is closely associated with the Army Aircraft Maintenance Wing and the army helicopter program, therefore the cake cutting ceremony was appropriately carried out with a replica of a CH112 helicopter tail rotor blade. Assisting in the cake cutting was S sgt KM Sturley, one of the first members of RCEME to enter the aircraft repair field.

Since the RCEME anniversary roughly coincided with the first anniversary of the transfer of a large group of RCASC personnel to RCEME, a second birthday cake, bearing the RCASC crest and a single candle was cut by WO 2 LJF Hill, assisted by Major WJN Haggins, Senior Army Aircraft Maintenance Officer.

Top	Float depicting normal RCEME procedure; craftsmen working, senior NCOs playing cards and drinking coffee
Center	RCEME Band led by Drum-Major J Thorne
Bottom	RCEME Platoon led by Capt FG Hutson

ANOTHER BIRTHDAY CELEBRATION

TECHNICIANS OF THE FORT GARRY HORSE CELEBRATE

Our 20th Corps Birthday was celebrated by all RCEME technicians of the Fort Garry Horse on the evening of 15th May 64. Cocktails and an excellent full course meal was served in the Men's Mess, followed by a full evening of dancing in the unit gymnasium.

We were honoured by the presence of several distinguished guests, namely Lt Col & Mrs WRC Little, Maj & Mrs F Rook, Maj & Mrs Svab , Capt & Mrs P Graye and RSM & Mrs EJ Armer.

As birthdays are supposed to be a happy occasion it was at one point rather sad when we had to bid farewell to Capt & Mrs DH Curling. Capt Curling is returning to a new position in Ottawa early in June. We wish him and his family well in the future. At this time we had the pleasure of meeting Capt and Mrs Graye who will be joining us in the near future.

Our ETSM WO1 LJ George presented an appropriate farewell gift to Capt Curling and a bouquet of flowers was presented to his wife. Cfn Lussier was also presented with a farewell gift on his departure to Canada. As a special farewell Cfn Lussier also had the honour of cutting the traditional birthday cake.

In closing we wish to take this opportunity of thanking our Commanding Officer Lt Col WRC Little for the use of the unit facilities to celebrate this occasion; also a very hearty vote of thanks to our fine cooks for a job well done.

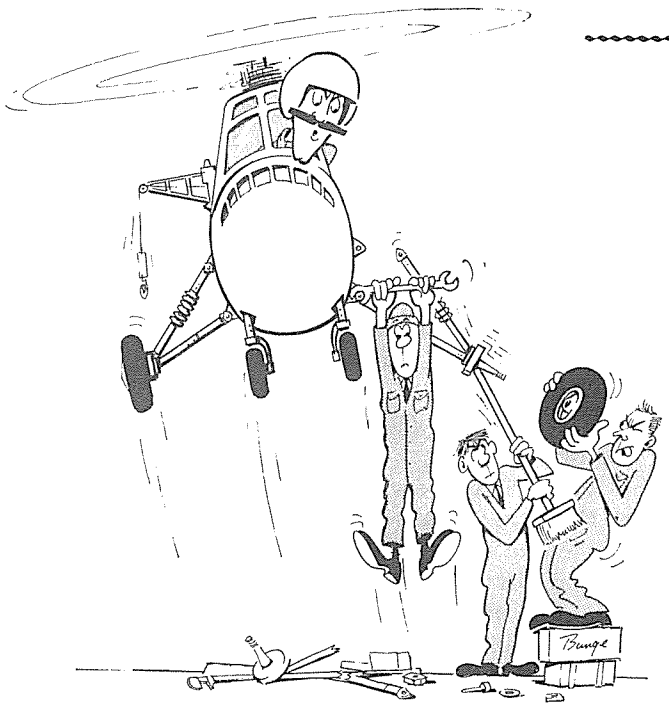
Spare in the Air

A comment by

Wing Commander Spry

"The evil that men do lives after them; the good is oft interred with their bones." Actually I didn't really say that. Another genius did and his words sum up pretty accurately the sort of public opinion to which any writer of comment is vulnerable – and they certainly describe the general reaction to my remarks. Criticism, however constructive, is remembered whilst praise is soon forgotten. Be that as it may, I have nothing but praise for all concerned with the following gem.

A Whirlwind was engaged in a trial on a range. The tests were unsuccessful and resulted in damage to the port oleo, unknown to the pilot. Approaching to land at the range control point, he was waved off and told of the damage; he then hovered while the oleo leg was removed and subsequently he returned to base. Here the groundcrew, forewarned by some quick telephoning, had obtained a complete replacement unit, had the necessary tools available and



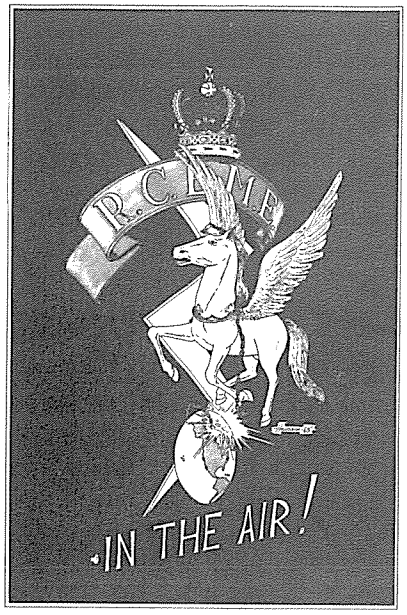
reassembled the whole leg with the aircraft again at the hover. The pilot was able to make a normal landing.

I reckon that for sheer, on-the-ball teamwork this takes some beating. Controllers, plumbers, equippers, not forgetting the patience and skill of the pilot, combined to keep an expensive aircraft fit to continue the trial.

HOW GOOD CAN YOU GET ?

-RAF Air-Clues

RCEME IN THE AIR



Quality Control and Assurance

By FO M MacIntyre in AMC Digest

The Quality Control Staff at AMCHQ has two overall aims. These are, first, to ensure that the RCAF obtains the required quality in purchased items for the least expenditure of its resources, and second, that this quality level is maintained after the material enters the RCAF and is put into storage and subsequent use.

The RCAF has found that the most effective way, commensurate with economy, of carrying out the first of these functions is to allow contractors to perform their own product inspection. RCAF inspectors, under such circumstances, perform a surveillance function over the contractor's inspection system. Through various systems of checks, the RCAF inspectors at a contractor's plant satisfy themselves as to whether or not a contractor's quality control system is capable of performing adequately. When problem areas are located, the RCAF inspectors and contractor personnel aid one another in bringing things back to normal.

The surveillance system, as outlined above, does not, however, constitute the sole guarantee to the RCAF that it is receiving quality material. It has been found that an additional checking method must be superimposed on the surveillance plan. This second line of assurance is called the quality audit system.

The quality audit, unlike the familiar financial audit, is not concerned with matters of dollars and cents. It is rather an annual check (carried out by CQC or one of the TSUs) on the methods and procedures of the RCAF personnel at a contractor's facility. The quality audit team checks whether the RCAF representatives at the contractor's plant are carrying out surveillance of the contractor's inspection system in the proper way. The team further checks whether the RCAF surveillance is of wide enough scope to ensure that the material to enter the RCAF will be of acceptable quality.

It might be wondered why a quality audit should be necessary at all. "Can we not trust our own people?" one might ask. The answer lies in the variability of the individual human being. While one officer or airman performing surveillance may be extremely cautious and formal in his dealings with a contractor, another might tend to be the type of person who too readily agrees with a contractor's point of view. In addition, it often happens that RCAF personnel who are newly transferred to contractors' plants have had no previous experience in industrial facilities. The quality audit is the answer to these difficulties. It brings about standardization in the methods and procedures of RCAF personnel at contractors' facilities, and provides a double assurance that materiel entering the RCAF is of acceptable quality.

A formal statistical analysis on past results of quality audits is now being undertaken by the AMC Quality Control Staff. This is being carried out with the aid of the electronic data processing equipment in AMC. The analysis will help greatly in measuring the present effectiveness of quality control at contractors' plants. It will also aid in plans for the future.

TRANSPORT AND RECOVERY PLATOON

RECOVERY SERVICE - Illustrating the tasks of the Brigade's 4 Field Workshop, RCEME, Sergeant G. Bellemare directs recovery operations to extricate this 3/4 ton truck from a difficult situation.

(4 Fd Wksp Photo)

When a soldier is out in a vehicle and his vehicle breaks down, the first question that probably arises in his mind is, "Now what?". The normal thing of course is to try and let his unit know about his problem. Once he has done that the unit decides that it either can or cannot recover the vehicle. If the unit has the recovery facilities, well and good, but if they haven't, or their facilities are not adequate, then they must call upon 4 Fd Wksp RCEME for assistance.

The main role of Transport and Recovery Platoon, then, is to provide the recovery services needed to supplement other units recovery facilities and to provide recovery services to those units that do not have wreckers of their own. The Transport and Recovery Platoon is sub-divided into three sections: a Transport Section, a Maintenance Section and a Recovery Section that carries out the main role of the Platoon.

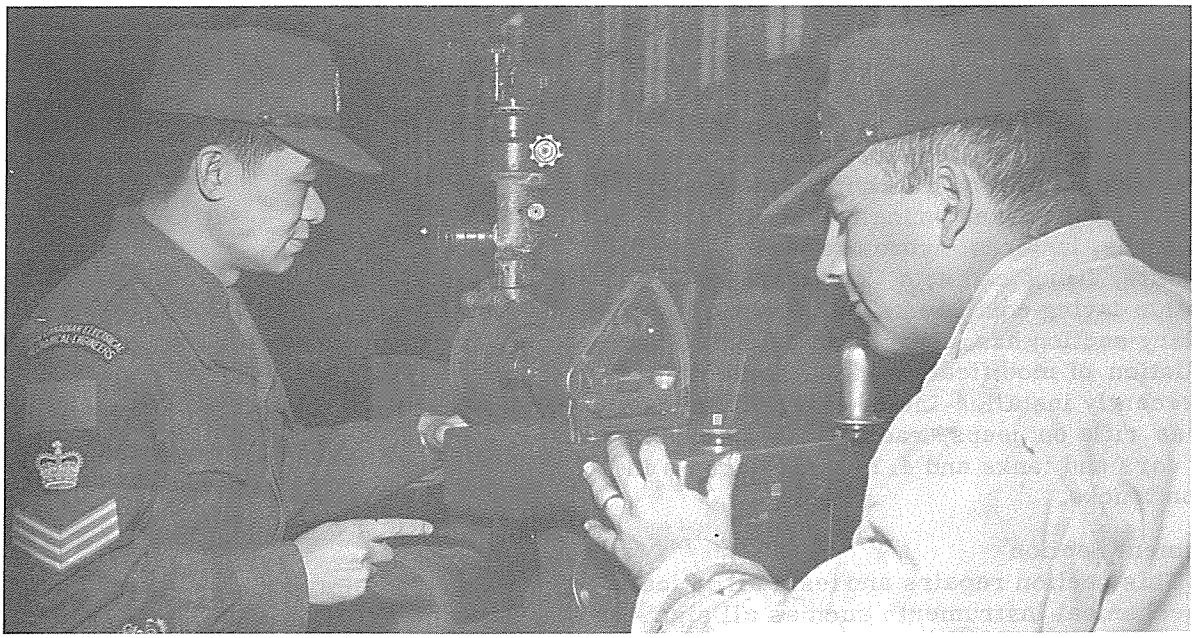
The Recovery Section is well equipped for their tasks. It consists of a Sergeant and nine recovery personnel under him. Their main equipment is a 5 ton wrecker, called the M-62 in military terminology. This vehicle is equipped with tools, tow bars, oxy-acetylene torches and all the accessories required to perform just about any imaginable recovery task. The operators of these wreckers are Group 3 vehicle mechanics, and on occasion, do minor repairs to vehicle casualties when it is more feasible to repair than to recover. Recovery services are provided to civilian vehicles when local recovery resources cannot do the job. These tasks contribute to good relations between Germans and Canadians.

Other equipment of the Recovery Section includes two tank transporters, one of which has acquired the nickname of "MIGHTY MOUSE". The wreckers of the section provide heavy lift assistance to other units and also within the workshop, including lifting engines, heavy assemblies etc. The recovery resources of 4 Fd Wksp RCEME are operational 24 hours a day.

The other roles of the Transport and Recovery Platoon are to provide transport for the unit and carry out maintenance on the vehicles. The transport Section provides the drivers and do all associated tasks normal to a unit transport organization. The Maintenance Section are responsible for carrying out all maintenance and unit repairs on vehicles.

Cfn J.C. Julien working on the Ferret

WEAPONS AND ELECTRONICS PLATOON



Sight testing a 105mm field gun requires training and patience. S sgt Bing and Cpl Switzer are shown aligning the axis of the base with the carriage sighting equipment.

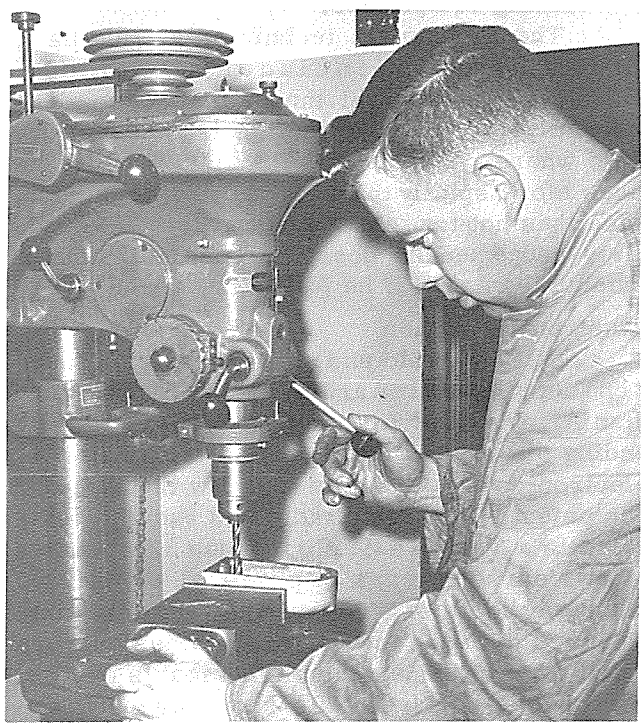
Weapons and Electronics Platoon is a relatively small but highly diversified part of 4 Fd Wksp. The platoon consists of Weapons, Instruments, and Electronics sections and has the tradesmen and equipment to effect repairs ranging from the repair of delicate watch mechanisms to the repair of a 105mm Howitzers. The members of the platoon are skilled technicians whose trades are generally recognized in civilian life as well as in military. Before being allocated to a field workshop these tradesmen receive a basic training at the RCEME School in Kingston, and trades experience in the various base and static workshops in Canada.

Weapons Section

This section is made up of three sub-sections; Small Arms, Armament and Ancillary. Each sub-section is headed by a Staff Sergeant with a Corporal to assist him.

The Small Arms sub-section is responsible for the repairs and modifications to all small arms used in the Brigade. Such weapons range from the .22 calibre rifle to the 106mm recoilless rifle. In addition to this, weighing scales and office scales are repaired and maintained by the Weapons Technicians of this sub-section.

The Armament sub-section looks after



Cfn Gethings carrying out a modification to a compressor flange unit.

all the artillery equipment in the Brigade. These equipments include the 105mm howitzers, 20 pounder tank guns and the 762mm Rockets.

The most difficult and most interesting sub-section is the ancillary section which includes the machine shop. All equipment not peculiar to other trades are looked after by this section. Some of the equipment that will be found being worked on include steam cleaners, stoves, lanterns, hydraulic jacks, mobile bath units, filing cabinets, paint spray units and cable laying equipments. In the past, the ancillary section has always had a hand in the installation of modification kits. Some of the kits recently installed include the 106mm recoilless rifle on jeeps, radio installations in scout cars and tanks and 4.2-in mortar kits in 3/4 ton trucks.

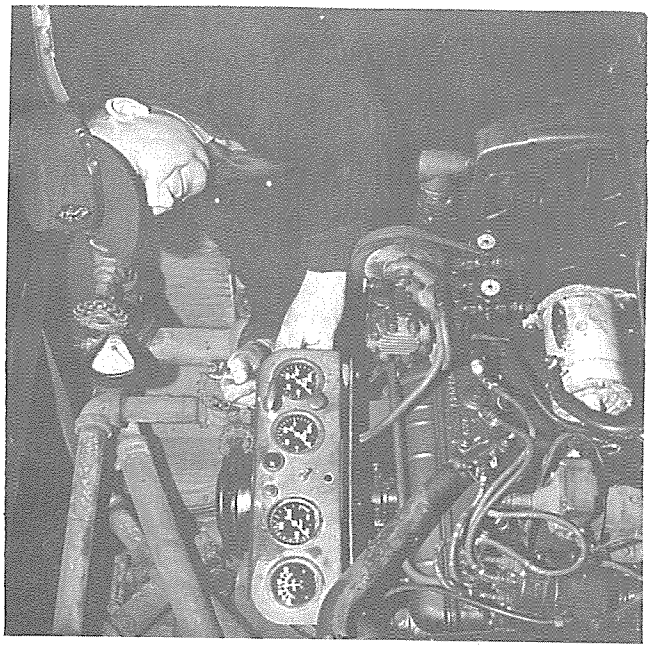
Instrument Section

This section repairs and tests all optical and mechanical instruments such as all sighting equipment which has a telescopic or periscoptic nature, all angle-measuring equipments, compasses, directors and theodolites, and time-measuring instruments. Also included in the scope of repair are speedometers, tachometers, pressure gauges, regulator valves for welding equipments.

The instrument technician's training is long and varied. It includes bench fitting, machine shop, optical theory and some electrical theory. When trained he is ready for the field where, if variety is the spice of life, he lives more spicily than a Mickey Spillane hero. Also it is not true that he never gets his hands dirty and when he does, he does not think it funny to be asked if he fell in the mud.

Electronics Section

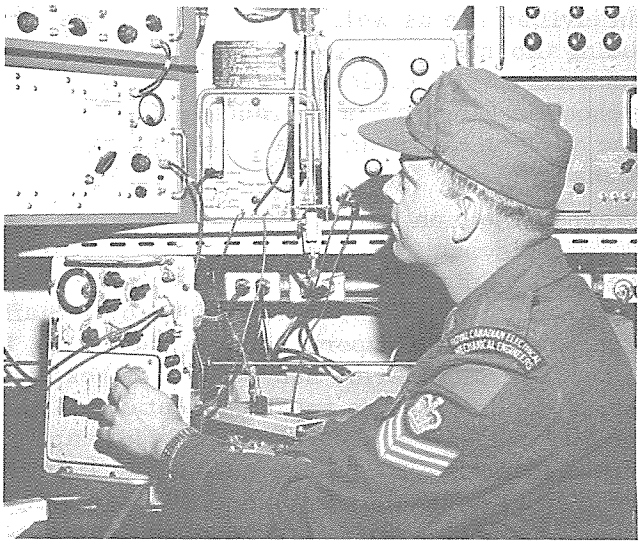
RCEME radio and radar technicians have a challenging and rewarding career in the Canadian Army. They find that studying is a never ending process in the wide and varied field of electronics to keep abreast of new theories and equipments. Training radio and radar technicians to a trade level of group 3Z requires many courses, years of practical experience and many hours of study on his own. The time required to reach the 3Z level varies between 5 and 7 years depending on the man's ability. He may then advance his knowledge and experience to attain a trade level of 4A and Master Radio or Radar Technician.



Cfn Forbes adjusting the regulator on the high pressure fuel system for mobile bath unit.

The Electronics section consists of two sub-sections, radio and radar.

The scope of equipment the radio subsection repairs is extensive and will run from large mobile transmitters to homing antennae. These include all types of radio sets, test equipment, radiation measuring and computing devices, telephones, switchboards, mine detectors, projectors, tape recorders, public ad-



S sgt Morden checking the calibration of a signal generator with a frequency counter.

(continued on page 17)

AIRCRAFT PLATOON

Capt Cooper and S sgt Barnes discuss the results of the flight test. Cfn MacLean goes aloft to check the product of his labours and handle the tracking light.

The Army have been using aircraft ever since WW II, when Artillery spotter aircraft came into common use. Although the business of flying aircraft is not new to the Army, the business of maintaining aircraft in an Army field formation is relatively new. In the past "Field Repairs" were done at RCAF static facilities, but when helicopters became part of our brigade, it became necessary to form a RCEME element to do this work in the field.

Just two years ago, the Aircraft Platoon was formed and sent to Germany with the CH112 helicopters. This platoon is responsible for all "Field Repairs" to Fixed and Rotary wing aircraft within the brigade. The men selected to carry out this role were all qualified tradesmen in their own right. In addition to their basic trade, these men have completed specialized aircraft courses in the USA and have done in-job-training with the RCAF and RCN. Many of the Master Aircraft technicians have received special factory conducted courses on the CH112 helicopter. With this experience behind them, the tradesmen of the Aircraft Platoon have found little difficulty in carrying out their role.

Not all repairs can be carried out by the Aircraft Platoon. As with other types of equipment, some repairs exceed their echelon repair. That is repairs that would take too long to complete, or required specialized training, or equipment that is not available in the platoon. In these cases a Mobile Repair Party is sent out from RCAF contractor, or the component or complete aircraft is shipped to the contractor for repair.

The equipment the Aircraft Platoon uses is portable and in most cases is mounted in Shop Vans, which act as a mobile workshop in the field. Although the Aircraft Platoon is an integral part of the workshop and wholly dependent on it for static administration, the platoon is equipped to be self contained for field operations. The men are never happier than when they are operating at an air strip off on their own. I believe it's Tex's cooking that interests them most.

The platoon is organized into four sections. The HQ Section provides the Command and Control element for the platoon as well as looking after the supply and administrative needs when in the field. The Log Control function is a most important function when dealing with aircraft. Log Control involves keeping a record of the time flown on each aircraft so that Periodic Inspections can be carried out and time expired parts changed at a specified number of flying hours. The whole object in aircraft maintenance is to provide adequate and timely preventative maintenance. They don't pull over and park worth a darn.

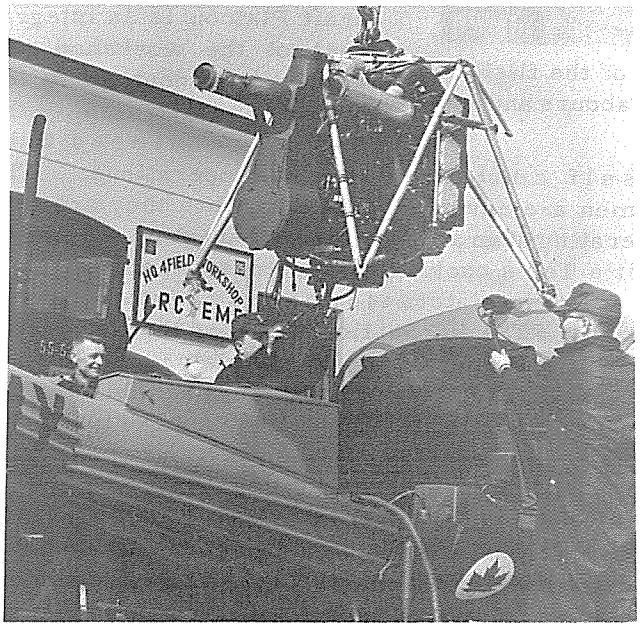
The Rotary Wing Section is the largest in the platoon. This section comprises 14 helicopter technicians, whose job it is to carry out Periodic Inspections and repairs as they are required. Their work ranges from routine transmission and engine change to special dye-penetrate inspections, used to show up cracks or flaws causes by metal fatigue. Their job is

exacting and they are all very much aware that a cotter key left out on the repair line means disaster in the air.

The Fixed Wing Section is the smallest in the platoon. It comprises four tradesmen who are permanently employed at 2 RCHA. These men carry out "Field Repairs" on L19s, which must be carried out 'in-situ' because of the lack of accommodation at 4 Fd Wksp. This is a flexible group and can be expected to join up with the platoon at any time, once they are in the field.

The Ancillary Section is comprised of all those tradesmen who are required to support the main aircraft repair section. These allied tradesmen come directly under the supervision of the Fixed and Rotary Sections when they perform their work on the aircraft. The Radio, Instrument, Electrical and Sheet Metal Sections all have a very important role in the repair of aircraft. Their work is varied and most interesting.

It would appear to the layman, that it takes a lot of men to maintain a few aircraft. They are quite right in their assumption. Safety requirements demand that regular inspections be carried out to prevent in-flight failures; components must be changed on a time expired basis; and there must always be a second tradesman to check on the work of the other. The complexity of the aircraft itself demands a high maintenance factor per flying hour. In the case of the CH112 helicopter, 10 to 1; that is 10 hours maintenance are required for each hour of flight. In comparison to the 2 1/2 ton truck, this type of helicopter takes as much maintenance as would a fleet of approximately 40 vehicles. Regardless of this high maintenance factor, the aircraft has demonstrated its worth in the direct support of ground troops. Aircraft will be with us for a long time to come and the men of the Aircraft Platoon are determined to keep them flying.



Easy Does It! Cfn AJ Boulton, Cfn RG Paul and Cfn AW Michaelis gently lower a new engine into place in a CH112 helicopter.

A Ticklish Job - Cfn NC Heldman making a welding repair to a paper thin exhaust shroud from the engine of a CH112 helicopter.

New Feathers! Cfn NC Heldman replaces the skin, after repairs have been made to the ribs of an L19 stabilizer that was badly damaged in the field.

SPSS continued from page 11)

are listed, a Storeman selects the items demanded and issues them directly. This appears to be quite a simple process on the surface, but such availability is the result of a complex supply system, the success of which ultimately depends on the efficiency of the individual clerk and storeman.

For instance, the storemen are responsible for warehousing all stocks in some 4000 containers carried in the section vehicles. At the same time, an accurate location system must be kept up to date so that any item of stock can be readily found when required. It is also essential that every part be properly identified and accounted for: that it be protected against damage or deterioration in storage and so be fit for use at all times.

If the storeman has well-stocked shelves, he can thank the clerks, because they are responsible for keeping the replenishment pipeline filled. The SPSS has about 8000 stock record cards, one for each kind of item held in stock. Not only does the clerk keep precise records of the quantities held in stock, but he must be very alert to order more before stocks are exhausted.

The whole process of receipt, warehousing, issue and replenishment, is a never ending cycle which keeps every member of the SPSS busy. This process must be studied carefully in order to perceive usage trends, and to keep ahead of changing requirements. Warehousing problems must also be closely watched since space on vehicles is necessarily limited. As a result, every member of the SPSS is important, for individually and collectively their contribution has a direct bearing on the efficiency and productive capacity of the RCEME workshop.

ELECTRONICS continued from page 14)

dress systems, etc. In addition, the radio subsection is called upon to do planned inspections of unit equipment and installation of electronic equipment in fixed locations or in mobile carriers.

With the advance of more complicated electronics equipment within the Brigade, a radar sub-section has been added to the Electronics Section. The scope of repairs includes ground surveillance radar, distance measuring sets, and electronic control systems for anti-tank guided missiles and missile simulators.

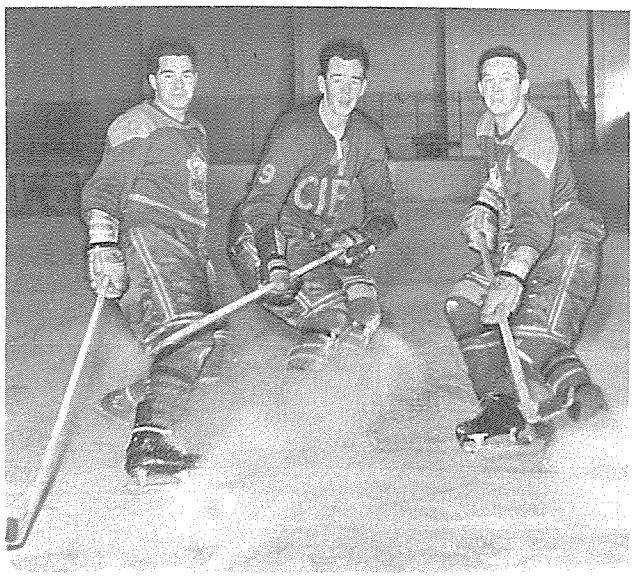
RCEME SPORTS

Since hockey is of prime interest in the brigade it must be mentioned that 4 Field Workshop contributed a great deal to the Fort Chambly Huskies. The team included Cpl Burnie, L/Cpl Sears, Cfn Boles, Cfn Lesage, Cfn Brown and Cfn Firlotte. Once again they are congratulated on their great achievement. In addition the unit has its own hockey team that plays against other unit's "minor" teams on an ad hoc basis whenever opposing teams and ice time are available. The main competitors were teams from the RCRs and Recce Squadron.

In curling the unit competitors were very active. Curling leagues were set up consisting of a mixed and a men's league.

The unit basketball team with Capt Johannas as coach and Cpl Paisley as manager participated in the brigade minor basketball league. The team reached the semi-finals and are congratulated for their fine effort.

4 Field Workshop fastball team participates in the minor fastball league and reached the finals last year. Unfortunately they lost out to the 1 SSM Bty but this year the team hopes to go all the way. Other sports in the unit include volleyball, bowling, squash, tennis and badminton. In whatever sports members may participate, the unit wishes them the best of luck in their efforts.



Tpr Jodoin, Recce Sqn, Lcpl Sears, and Cfn Lesage.

IN RETROSPECT

The Award of The Queen's Medal
(for champion shots in the Military Forces)
to
ZG 2644 Lieutenant Reginald Frost Fendick (1948), and
SK 18366 Sergeant Joseph Robson Hardy (1956)
The Corps of Royal Canadian Electrical and
Mechanical Engineers

By Lt-Col RH Hodgson, CD

A medal for the best shot in the British Army was authorized in 1869. It had on one side the head of Queen Victoria, with the usual inscription, and on the other a figure of Fame standing on a dais. She has a horn in her left hand, and with her right is crowning a kneeling warrior with a wreath of laurel. The warrior is armed with a bow, and holds a shield pierced by three arrows. The medal was instituted in 1869, and was awarded each year, with a gratuity of twenty pounds sterling, to the best rifle shot in the British Army. It was issued in bronze until 1872, and then in silver, and was worn on the right breast. It became obsolete in 1883, and as only thirteen of the medals were awarded, specimens are very rare indeed. A somewhat similar medal, with the same ribbon, was at one time presented to the best rifle shot in the Indian Army. The original ribbon had a centre of dark crimson, watered, with black, white and black stripes at each edge.

On the recommendation of the late Field Marshal Earl Haig, His Majesty King George V, in 1926, graciously approved the award of six medals to be awarded annually to the Champion shots, respectively, of the Military Forces at Home, and the Military Forces of India, Canada, Australia, New Zealand, and South Africa (including Rhodesia). The medal, worn on the left breast, has the Royal effigy on the obverse with the usual legend, and on the reverse the same design as that of the older medal of 1869.

The medals are competed for at an annual central meeting in the countries named, under battle firing conditions.

In Canada, at the request of the Department of National Defence, the competition is conducted by the Dominion of Canada Rifle Association.

This year for the first time, there will be two medals for competition in Canada. One medal for the Canadian Army (R), and the other for the Canadian Army (M) and the Royal Canadian Mounted Police.

The prize, now known as the Queen's Medal, may be worn by the winner during the whole of his service. In each case in which a medal is issued, a clasp is affixed denoting the year of award. An additional clasp only is issued for a second or further award for the same individual.

In uniform, when ribbons are worn, the grant of a second or further clasp is denoted by the wearing on the ribbon a small silver rose; one or more, according to the number of clasps awarded.

Major Fendick and OHM (WO2) Hardy have each set an example to The Corps by competing for and winning this coveted award against all comers in the Army, both Regular and Militia, and the Royal Canadian Mounted Police.

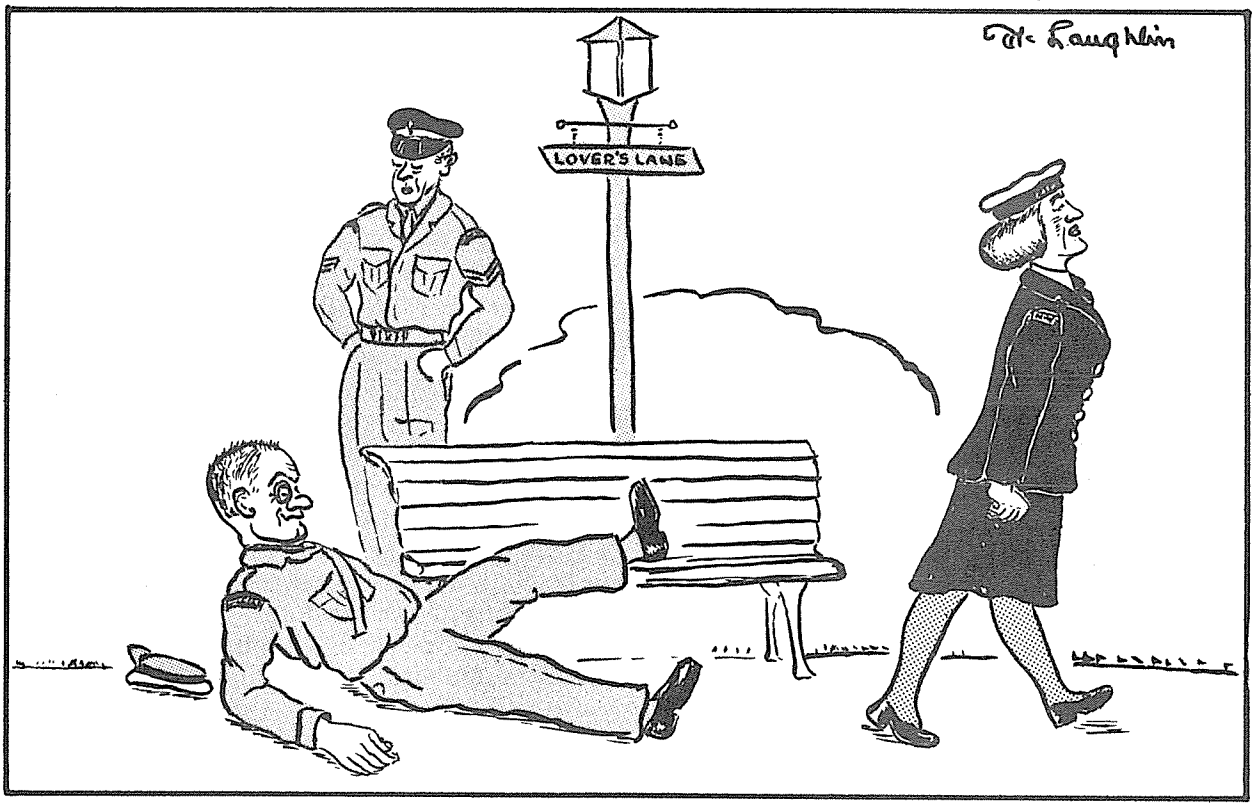
THE
QUEEN'S
MEDAL

← Obverse

Reverse →

Major Reginald Frost Fendick, CD
RCEME School
Kingston

QMS (WO2) Joseph Robson Hardy, CD
4 Field Workshop, RCEME
CBUE



PERSONAL ATTEMPTS AT SERVICES INTEGRATION NOT GOING TOO WELL, CFN MACFUDD?

3 RCHA LAD PRESENTS SHIELDS TO 3 RCHA

By Capt WJ Shearing

In most units, you can find many assorted trophies; you can find them for darts, curling, golf, softball, and so on; you can find them honouring those lucky individuals who rolled "five aces in one"; and, you can find them in the oddest forms, such as those fur-lined chamber pots which we usually see in Officers' Messes. BUT – how many trophies have you ever seen awarded for maintaining equipment at a high standard? Surely, from a RCEME point of view, well maintained equipment should receive as much recognition as "five aces in one".

During my posting with the 3rd Regiment, Royal Canadian Horse Artillery, each trip to the CO's Office took me past the Regimental Trophy Cabinet. On each visit, I would see trophies for just about every competition possible. Every trip by that trophy cabinet reminded me of the hard work which went into maintaining the Regiment's equipment. Every trip reminded me of the competition between sub-units produced by an equipment inspection. Why didn't that cabinet have a trophy for the best vehicle or best gun in the Regiment?

After a year of this mental torture, I decided to do something about it. Either I get the CO to come to my office instead of me going to his, or there must be a trophy for maintenance in the Regimental Trophy Cabinet. Well, you have probably guessed what my solution had to be. The members of 3 RCHA LAD were quickly assembled, and after some discussion we came up with a solution which I felt the CO might go along with.

The result of our discussion was the procurement of two shields of French walnut, 30 centimetres by 20 centimetres (we were in Europe at the time), with matte silver title and annual plates. The title plate on each shield had an engraved RCEME crest of polished silver surmounted on it. Since the LAD was about to be disbanded, the two shields were named as follows:

a. The 3 RCHA LAD Shield for Vehicles; and,

b. The 3 RCHA LAD Shield for Guns.

"The 3 RCHA LAD Shield for Vehicles" was presented to 3 RCHA by the members of the Maintenance Troop who were with the LAD at the time of its disbandment on 1 Aug 63. This shield will be awarded annually by the sub-unit of 3 RCHA whose vehicles (motorcycles and trucks) obtain the highest average servicing score during the Annual RCEME Inspection.

"The 3 RCHA LAD Shield for Guns" was presented to 3 RCHA by myself as the last CO of 3 RCHA LAD. This shield will be awarded annually to the gun detachment whose gun obtains the highest servicing score during the Annual RCEME Inspection (3 RCHA has borrowed a scoring system used in 4 CIBG).

The purpose of these shields is to provide permanent recognition of the effort made by the best sub-unit, and by the best gun detachment, to maintain their equipment at a high standard. In the event of a tie, in keeping with the purpose of these shields, the shields will be jointly awarded to all of the sub-units and the gun detachments who obtain the highest score.

The shields were awarded for the first time based on the results of the Annual RCEME Inspection held in Germany in December 1963. X Battery was awarded the "Shield for Vehicles" with an average servicing score of 97.35. The "Shield for Guns" was jointly awarded to nine of the Regiment's twenty-four gun detachments, each obtaining a servicing score of 100.

It was our real aim in presenting these shields to provide an incentive for those who have to spend many hours working on equipment, to provide recognition for those who

worked the hardest, and to provide a small reminder to the Regiment of the LAD which gave faithful service until its death was caused by an SD letter. Just prior to our return to Canada, Lt Col WM Turner CD, CO of 3 RCHA, sent a personal letter to me thanking the Troop for its support and its kind gesture in presenting the two shields to the Regiment. Judging from this kind letter, which I am very proud of, 3 RCHA Maintenance Troop achieved its aim. Unfortunately, now that 3 RCHA has a trophy for maintaining equipment, I no longer get to walk past the Regimental Trophy Cabinet (I am in Ottawa, and the cabinet is in Winnipeg).

Capt WJ Shearing is shown presenting "The 3 RCHA LAD Shield for Vehicles" to Sgt JBX Girard MT NCO of X Bty 3 RCHA which obtained the highest average servicing score for vehicles in the last Annual RCEME Inspection of 3 RCHA.

Lt Col WW Turner CD, CO of 3 RCHA, is shown presenting "The 3 RCHA LAD Shield for Guns" to the nine gun detachment commanders whose guns obtained the highest servicing score in the last Annual RCEME Inspection of 3 RCHA.

-3 RCHA Photos

L'entrainement des Officiers Cadets de 2e phase a l'école du RCEME

By Lt JF Boudreau and 2/Lt JDG Choquette

Photos by Capt WA Thomas

L'effervescence était grande à la "Maison Blanche", quartier général de l'Ecole du Corps royal canadien du Génie Electrique et Méchanique. Nous étions déjà en Avril, les commandants de compagnies se réunissaient sous la direction du Colonel KR Ward, Commandant de l'Ecole, pour discuter du programme d'entrainement des officiers cadets de deuxième phase.

Le programme d'instruction preparé pour l'entrainement de deuxième phase pour l'été 64 fut pratiquement le même que l'année précédente. La durée en fut de dix semaines.

Le nombre d'officiers cadets étant d'environ quarante il fut donc nécessaire de les diviser en deux pelotons. A tour de rôle, ils visitèrent les compagnies de l'Ecole Electronique, Vehicule, Armement, Régimentale pour se familiariser avec l'equipement et les méthodes employées pour leur réparations.

Compagnie de l'Armement

Sous la direction du Major HH Erb, les officiers cadets passèrent deux semaines a apprendre les rudiments de l'atelier d'usinage, et les principes d'opération et d'entretien des armes et des instruments.

Ils eurent l'occasion de se familiariser avec le fonctionnement des tours, l'usage des meules de rectification pour la préparation des mèches-outils. La théorie apprise au début du cours fut mise à l'essai puisque les étudiants avaient à manufacturer certains objets pratiques comme porte-crayon, fil à plomb et bien d'autres encore.

L'entretien et l'opération des systèmes d'armements comme le 105 mm Howitzer, le 155 mm Howitzer, le 106 mm sans recul, et les armes portatives étaient ensuite étudiés. D'abord l'affut, et les mécanismes de recul; ensuite le fonctionnement des armes. Comme futur officiers ils étudièrent le démontage et

O/Cdt Glynn de College Militaire Royal de Kingston recoit les instructions du Capt Stow, Officier d'entrainement de 2 ieme phase.

O/Cdt Pergat de l'Université McGill donne des instructions sur les détails de la route avant l'opération.

l'assemblage du pistolet 9 mm avec soin. Enfin, la méthode la plus efficace d'inspection des armes portatives fut étudiée et discutée.

Enfin, une troisième et dernière portion des etudes à la companie de l'armement, porta sur les principes d'opérations et d'entretiens des instruments d'optiques comme les jumelles, les indicateurs de distance, et la boussole.

O/Cdt Potter du College Militaire Royal de Kingston vérifie son camion avant de partir vers l'emplacement d'un camp pour la nuit.

QUI EST LA? Le camion de l'O/Cdt Potter. Plusieurs heures plus tard, camouflé dans le bois.

Compagnie du Vehicule

Une période de deux semaines de travail intense débuta par un mot de bienvenue par le Major DJ Tremeer REME, jeune officier de l'Armée britannique.

Ici les officiers cadets eurent l'occassion de se familiariser avec tous les aspects du systeme automoteur. En plus, ils purent observer la méthode de reconstructions des moteurs et la récuperation des voitures sous les conditions les plus difficiles.

La première partie du cours fut consacrée a l'étude des circuit d'allumage, des systèmes de freins, des systèmes de carburations, et enfin des mécanismes de direction.

Le fonctionnement et l'entretien des voitures militaires étaient l'object de la deuxième partie du cours. Ici, l'attention des officiers cadets se porta surtout sur le char centurion et le camion de 2 tonnes et demie. En plus l'importance de la vérification journalière des voitures fut accentuée.

Une des parties la plus intéressante de la mécanique, la reconstruction des moteurs, fut enseignée pendant la troisième partie du cours. La vérification des soupapes, des culasses, piston, bielles, coussinets, vilbrequin, arbre à cames et autres fut étudiée en détails. En plus, les officiers-cadets purent se servir de l'aleseuse pour la réparation des bloc-moteurs.

Mais les moments les plus goûtés par les étudiants et instructeurs furent sans doute lorsqu'il fallut récuperer un char centurion d'une mer de boue. C'était la quatrième partie du cours. L'engin blindé de récupération centurion était employé pour récupérer les chars. Le char fut ensuite chargé sur le camion porte-char de 60 tonnes à l'aide du camion-trevil de dépannage M 62.

Compagnie de l'Electronique

Le Major LA Daviss eut la visite des officers cadets pour une période de deux semaines.

La première partie du Cours en électronique était consacrée à l'etude des radios 26, 510 et 42.

Un autre sujet à l'étude était les transistors. D'abord la théorie des semi-conducteurs en général, ensuite celle des diodes et des amplificateurs à deux stages.

Le système équilibreur du char centurion fut aussi étudié par les officiers cadets. La description des contrôles du canon et le fonctionnement du mécanisme feurent d'abord portés à l'attention des étudiants. Ils eurent aussi l'occasion de faire fonctionner ce merveilleux système.

Le nouvel équipement acquis pour l'Armée Canadienne récemment "Navaid", un système de navigation terrestre qui permet aux troupes de naviguer la nuit, fut examiné par les étudiants, d'abord l'opération du navigateur automatique, puis la vérification de son bon fonctionnement.

Les détecteurs infrarouges pour carabines ainsi que ceux sur trepieds étaient aussi au programme. D'abord il y eut l'explication des machines infra rouges en general; ensuite les étudants apprirent les méthodes de vérifications et le fonctionnement de ces machines.

Le dernier sujet à l'étude fut le radar. La théorie fondamentale du radar fut scrutée par les officiers cadets. Ils virent aussi les contrôles et l'opération des radars PPS 4 portatif et le radar contre-bombardment PRQ 501. Ils apprirent les méthodes les plus modernes pour la vérification et la réparation de ces appareils.

La Compagnie Régimentale

Les officiers cadets de deuxieme classe eurent le privilège de retourner à la compagnie Régimentale, maintenant sous la direction du Major RF Fendick, pour une durée de trois semaines. Ils y apprirent la conduite des voitures militaires et leur entretien. Ils eurent aussi l'occasion d'étudier et de pratiquer le fonctionnement du RCEME en campagne.

Le cours de conduite des voitures militaires, débuta par un examen d'aptitude physique pour tous les officiers cadets. Ils apprirent à conduire les camions militaires, 1/4 de tonne, 3/4 de tonne, et 2 tonne et demie. Inclus dans ce dernier stage fut la conduite de camions en convoi et la prevention des incendies dans les camions.

A cette compagnie les étudiants recurent la partie la plus importante de leur cours: le fonctionnement du "RCEME" en campagne. Il y eut l'étude du rôle et des responsabilités du service technique de l'électricité et de la mecanique dans les éléments de brigade. Ils étudierent aussi le système de recouvrement et de réparation en campagne.

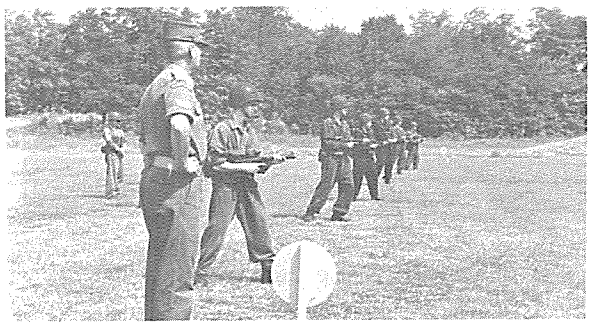
Le choix d'un site, ainsi que l'installation et la défense de l'atelier de campagne de réparation, fut l'objet d'un exercice intensif d'une durée d'une semaine en campagne pendant lequel les officiers cadets démontrerent leur savoir-faire et leurs qualites de chef, en assumant differents postes de commande. Cette semaine dans la grande nature, eut aussi un effet salutaire sur leur santé.

Conclusion

Après neuf semaines d'entrainement intensif, les officiers cadets entrèrent enfin dans leur dernière semaine, celle de la graduation. Plusieurs heures furent consacrées à la pratique des différents mouvements d'exercice pour la parade de graduation. Les officiers cadets furent passés en revue le 13 Aout. Le tout fut suivi par la bal traditionnel qui clotura officiellement les activités pour l'été 1964.

Démonstration du tir à la hanche d'une SMG par l'élève - officier Jacques Carrier du College Militaire Royal de St-Jean.

Au premier plan, on voit le CSM Campbell s'assurant que tous ont la bonne position.



TRAINING NOTES

RCEME Course Schedule

The "Courses Schedule and Allotment of Vacancies 1964/65" has been issued by AHQ. Personnel who are requesting courses on their confidential reports should check to see what courses are being conducted now at RCEME School as well as other Canadian Army Schools.

Pre-Group 4 Assessment

A new booklet outlining the standards for this year's pre-group 4 assessment has been published. The colour of this booklet is green, so disregard the red booklet. There are many changes in this new booklet, and all sergeants and substantive corporals in applicable trades should read it as soon as possible.

M113A1 APC Courses

The training plan for courses on the M113A1 for master vehicle technicians, vehicle mechanics wheeled and welders has been issued for 4 CIBG. The training plan for Canada should be issued shortly. Training will be conducted at 4 Fd Wksp and the RCEME School. The selection of personnel for these M113A1 courses will be made by AHQ and HQ 4 CIBG based on the distribution of the vehicles and the number of personnel required to support the vehicles in specific areas. The first courses in both Europe and Canada should start in Nov 64.

Special Course for Helicopter Technicians

A specially tailored course for 31 potential helicopter technicians has been arranged with the US Army. The course will be conducted at Fort Eustis. D Pers RCEME is now selecting candidates from the personnel who have volunteered for aircraft training.

Granting of Advanced Standing

Many of our tradesmen who have attended US courses have felt that the course content was too basic. The US Army's Ordnance Guide Missile School is now granting advanced standings to candidates. Two Canadian candidates have just received notification that due to their qualifications they are not required to join the course until its seventh week. DEME hopes that this policy will be adopted by other US Army Schools.

Trade Specifications and Tests

More new trade specifications have been published. The most recent are for Electrical Technicians Groups 1, 2, and 3, and Master Electrical Technician Group 4. Unit trades training programs should be based on these specifications. A new trade test is being produced for the Electrical Technician Group 2 and will be similar in format to the new Vehicle Mechanic Group 2 Trade Test. Did you notice that it is now "technician", not "mechanic".

CAO 270-4

We often wonder how many people know of the content of CAO 270-4 and are aware of what it can do for them.

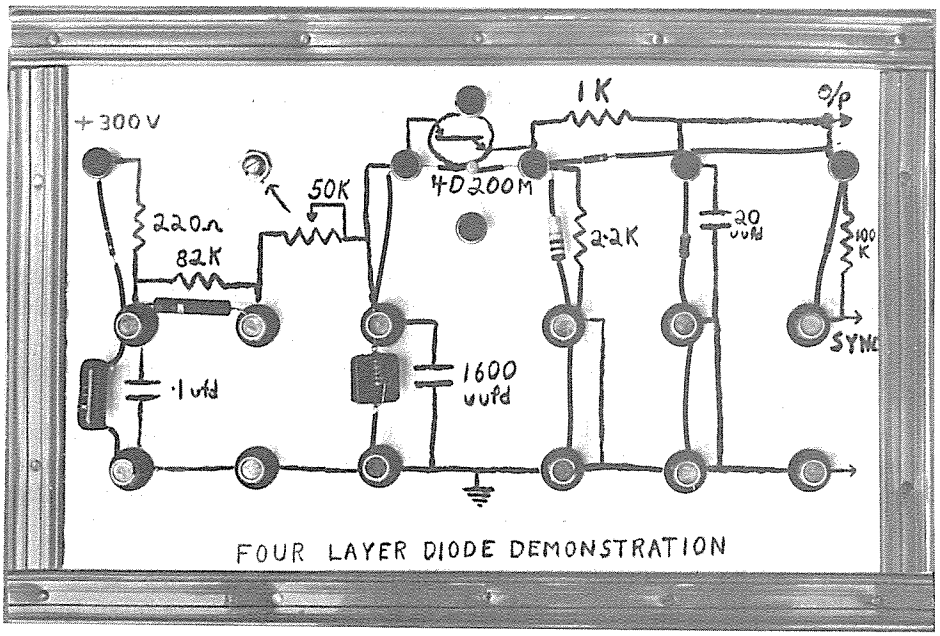
NO 142 RECRUIT PLATOON, RCASC SCHOOL, CAMP BORDEN

By Maj BM Deibert

On 18 Jun 64, twenty-four new soldiers completed their recruit training at the RCASC School, Camp Borden, Ontario. This platoon was a mixture of ten RCASC, eight RCEME and six RCAMC. They carried out a 'marching off' parade and were inspected by the Commandant of the RCASC School. This was followed by a PT demonstration in which all the graduates took a very active part. The parade and the PT demonstration were ample evidence that the training was obviously very good, and the Depot Company of the School deserves a word of praise.

I had the honour of sharing a place on the saluting stand with the Commandant of the School for the march past. Then I was given the privilege of congratulating the best recruit, Cfn DR Sercerchi, and presenting him with a belt, RCEME belt buckle and lanyard. This was a gift from 14 Coy RCEME.

It was encouraging to hear the OC Depot Coy state that the RCEME recruits were a great asset to the platoon. Their high average level of schooling seemed to have a stimulating influence on all phases of training. It helped foster a lively competitive spirit, and yet the co-operation among the recruits was very good.



FOUR LAYER DIODE DEMONSTRATION

TRAINING AIDS IN *ELECTRONICS*

By WO 2 KE Kraemer

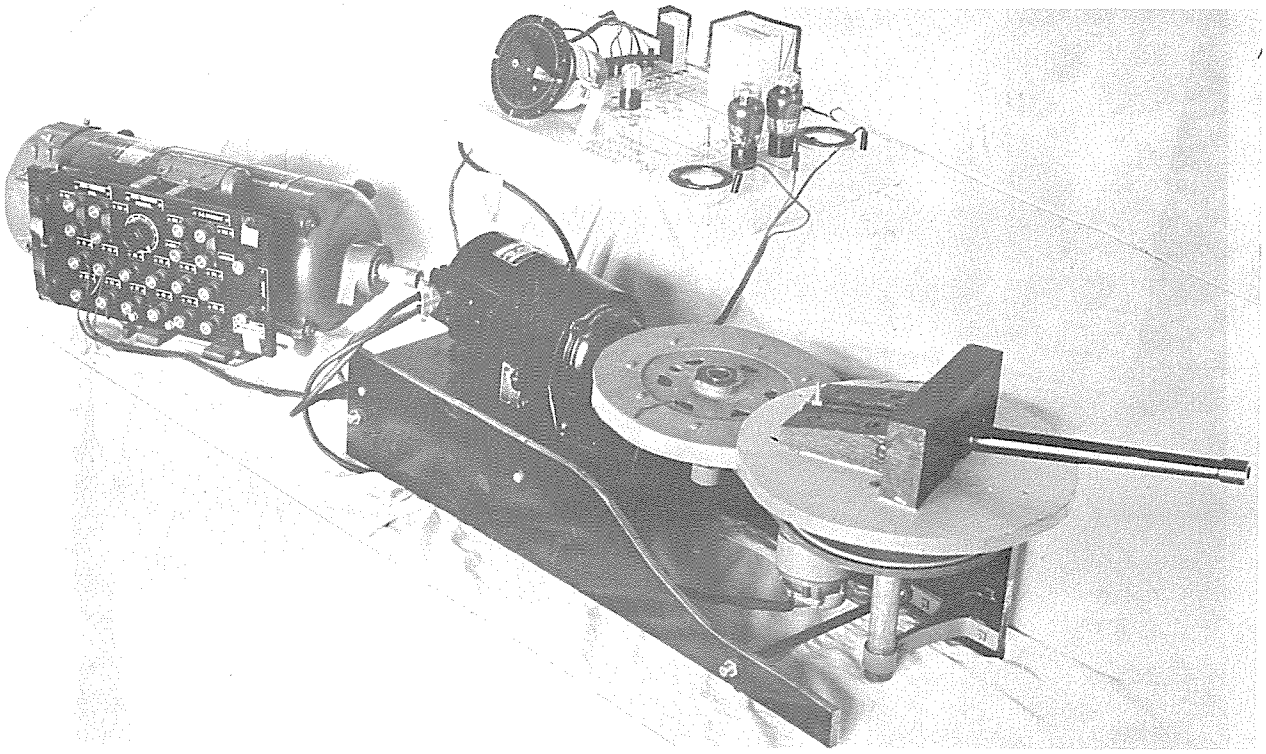
Films, pictures, drawings, slides, sound and mechanical models all come under the heading of training aids. However, here at Electronic Company, the RCEME School, innovation of locally produced training aids is generally limited to producing three-dimensional models and breadboards of electronic circuits.

The basic training aid in radio and electronics is the circuit diagram. In fact this training aid is so basic it is seldom referred to as a training aid. It is, as well, the electronic technician's principal tool. Of the three trades taught at the company – radio, electrical and radar – the radio trade offers the least scope for training aids other than the circuit diagram and breadboard display. The electrical and radar trades, however, since they are responsible for a greater number of electromechanical devices, offer considerable opportunity for introducing three-dimensional models and graphic displays.

Electronic equipment can normally be broken down to blocks of specialized circuits. If these specialized circuits are taught thoroughly, future equipments can be expected to consist mainly of regroupings of these basic blocks. To this end an extensive library of commercially-produced kits is used for introductory training.

Special training aids in the company are normally introduced by the instructors of the various equipment courses. Breadboard models of special circuits not provided in the commercial lines are made by the instructors who became aware of the need for an aid. An example of this is the breadboard layout of the four-layer diode trigger circuit used in the surveillance radar set, AN/PPS-4. Since this is a relatively new method of developing a trigger pulse for pulsed radar, it was considered to be advantageous to reproduce the circuit in breadboard form to facilitate observation of waveforms, component identification and for experimentation. A further gain of course is reduction of wear and tear on the training equipment itself.

The Electrical Section of the company has been the most prolific originator of electronic training aids to date. Aids have been produced to demonstrate motor and transformer principles, the Navaid control system, the tank stabilizer system, regulator systems, weapon sights, gyro and selsyn principles. An example of a training aid to demonstrate electromechanical control is well illustrated in the model of a gun platform for the centurion tank. Here a selsyn control positions a wooden model. As company workshop facilities are limited, components are often made from 'junk' giving the



Selsyn Controlled Gun Platform

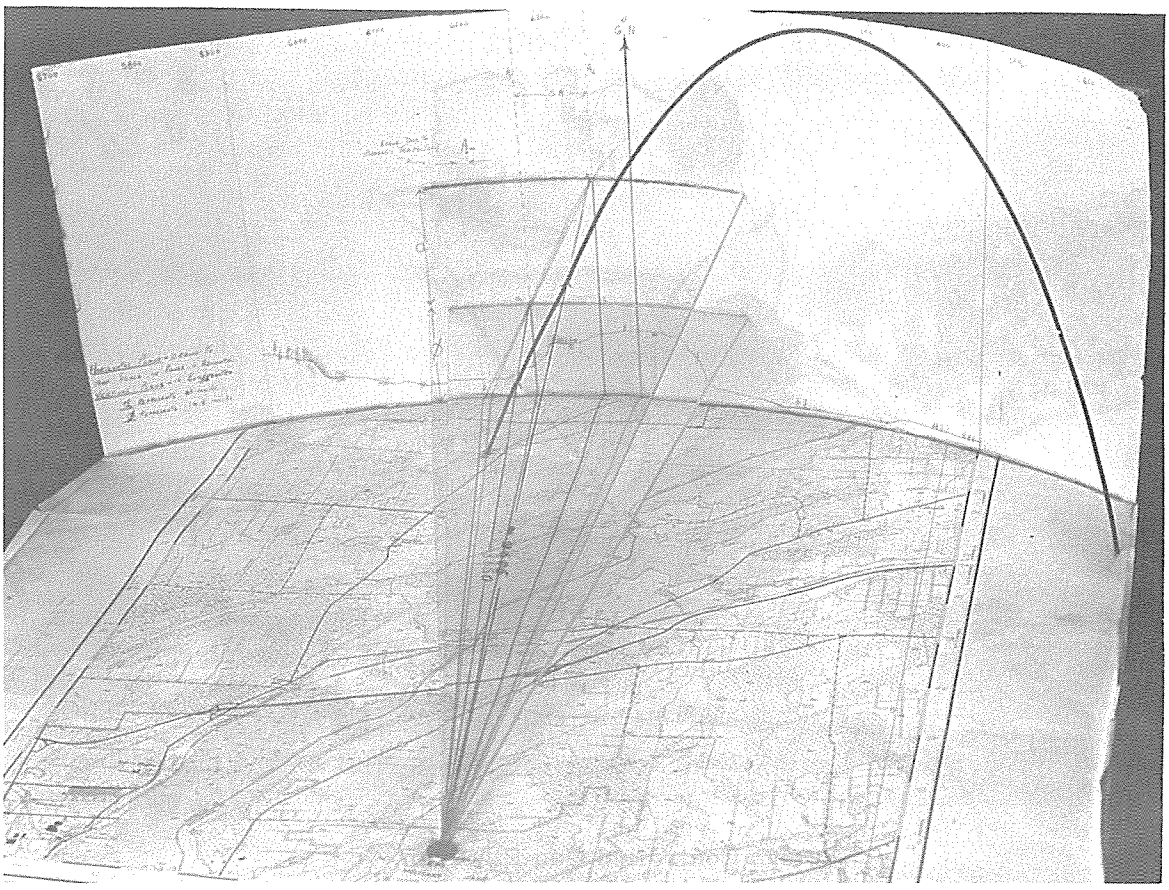
finished product a somewhat homemade appearance. Ingenuity is often required to adapt available materials to produce a working model.

Since radar uses radio waves like invisible searchlight beams it is a help in understanding a radar problem and its solution if the radar beam can be given visible form. Such an aid is the Radar Section model of a mortar trajectory and the split beams of the Counter Mortar Radar, AN/MPQ501. Here clear plastic sheets simulate the two fixed beams of the above equipment superimposed on a map of the local area. The path of the mortar shell through both beams providing the radar with intercept data is clearly shown.

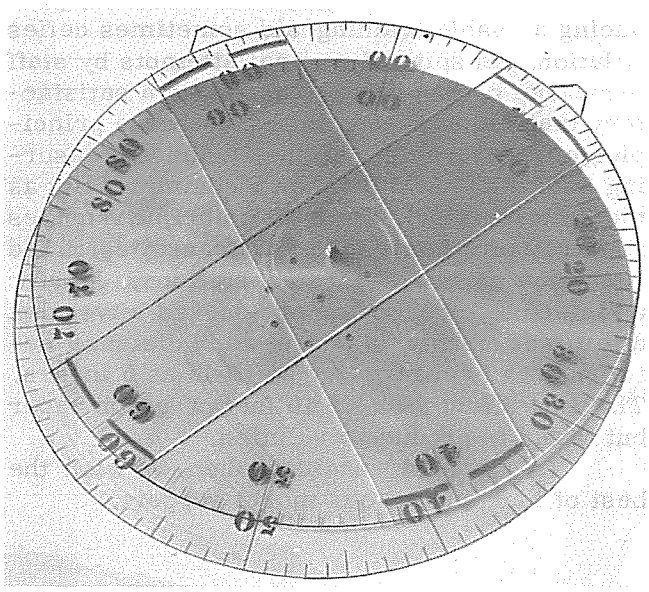
A variation of a valuable graphic training aid produced at minimum cost is the reproduction of the face of the CRT of the Distance Measuring Set, AN/TRQ501. This is to illustrate how centering and zero errors are corrected.

Even when a recognized need exists, producing a usable training aid sometimes defies solution. In spite of several attempts by staff personnel no one has yet produced a satisfactory method of presenting visually the principles of measurement of the Distance Measuring Set, AN/TRQ501 (known commercially as the Tellurometer). Here the principle requires illustration of how continuous transmission and reception at two separated stations, Master and Remote, produces phase-locked waves that alter measurably in phase when distance between sets is changed by as little as 6 inches. The last effort took up 10 feet of graph paper but failed to produce a solution.

To the next candidate then we wish the best of luck and all our moral support.



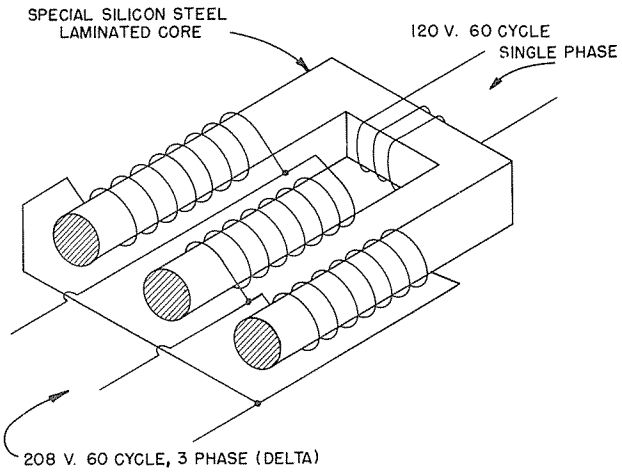
Counter Mortar Problem and Solution by Counter Mortar Radar AN/MPQ501



Reproduction of CRT Face to show off-center Error and Correction

TRANSFORMING SINGLE-PHASE TO THREE-PHASE POWER

This core design was developed in the design drafting department of one of the big industrial companies. The windings develop the only known method of transforming single-phase power to three-phase power. Power is only limited by the critical construction of the core.



TECHNICAL NOTES

MAINTENANCE AND REPAIRS STANDARD COMMERCIAL VEHICLES

An instance has occurred where a transmission and clutch assembly was damaged, due to incorrect towing procedures being used.

All recovery personnel must be made thoroughly familiar with towing operations and particular emphasis must be placed on disconnecting the propeller shafts, on all types of vehicles.

The procedure for correct recovery operations are contained in operator's manual (7610-21-102-1975) for Truck, Wrecker, 5 ton, M62. The procedure for towing each type of vehicle is contained in the operator's manual for the individual vehicle to be towed. If there is any doubt as to interpretation of the information contained in the operator's manual for the towed vehicle, the propeller shaft will be disconnected prior to towing.

TRUCK, STAKE, 3 TON, 4X4, FORD - 1964 OFF CD 263924

A failure report indicates that the tail lights and license plate brackets are being damaged by the swinging of the mud guards.

After investigation it has been decided this may be corrected locally by cutting and installing two pieces of strap iron approx 12 inches long. The strap iron pieces are fastened solidly at the top and down the edges of the flaps. This will hold the mud guards rigid, keeping them from flapping.

SEE PAGE 39 for more technical notes.

SAFETY POSTER

In April, 212 Workshop in Camp Shilo held a Safety Poster Competition. A large number of entries were received from members of the unit on various aspects of home and industrial accident prevention.

Judging was by Capt DM Mahar, Officer Commanding, Lt J Hanson, Control Officer, and S sgt CB Townson, Unit Safety Officer. The winners were Mrs L Kovach (first), Cfn DE Hooper (second), and Cpl WH Duncan (third). Prizes were presented to the winners by Col WS Hunt, Commander, Camp Shilo.

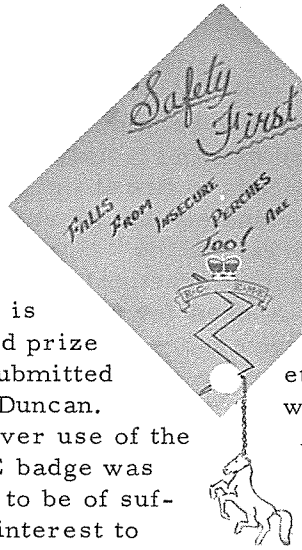
SUGGESTION AWARD

Colonel WH Colling, ED, CD, Area Commander NS/PEI Area (left) presenting WO 1 CH Baynes of 6 Coy RCEME with award certificate and cheque.

Mr Baynes was concerned when units were instructed to modify rifle racks so that either a U bolt or a chain would be put through the magazine opening on FN rifles to prevent theft.

He felt that the former method did not allow for the variation in butt lengths and the latter would cause damage to the machined surfaces within the magazine opening.

Realizing something had to be done quickly to prevent damage to the weapons involved, he designed a modification to existing rifle racks which resulted in a Suggestion Award.



This is the third prize entry submitted by Cpl Duncan. The clever use of the RCEME badge was thought to be of sufficient interest to merit inclusion in the Bulletin. The photo was taken by Sgt AA Bourassa of the workshop.

RCEME TECHNICIANS BUILD TANK RANGE MODEL

"Sabot 800 Tank ....

800 Set .....

On .....

On .....

Fire .....

Fire Now – Add 200.

Fire .....

Target Stop". .....

By Capt DH Curling

The sharp, clear tank fire order is given. A 105 MM gun is brought on target, "fires", an enemy tank is destroyed. A typical tank action is completed in the Fort Garry Horse Miniature Range. A target model built by two RCEME technicians now allows more realistic engagement of targets in the Miniature Range.

What is a tank miniature range (IMR)? Sited in a building specially constructed as a standard indoor (0.22) range, it is approximately 100 feet long and 15 feet wide. At one end is a sand stop-butt and at the firing point a tank (Centurion). Attached to the main armament of the tank is a specially constructed 0.22 rifle bracket designed to enable the fire of the main armament to be simulated.

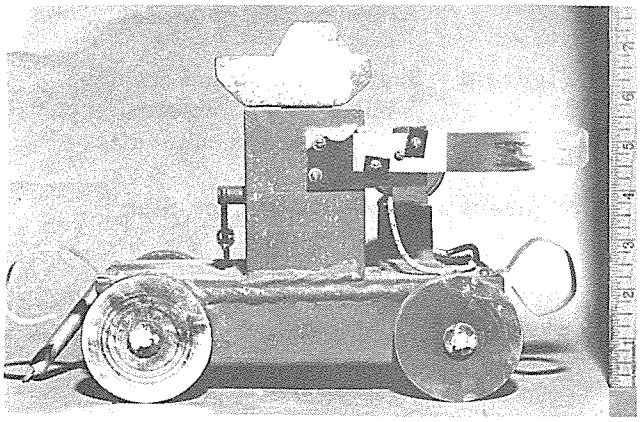
The IMR is an extremely useful training aid. Normal practice is to fire at fixed targets down range. Unfortunately the gunner only shoots at a range target and the "sight picture" is unrealistic. Constant practice becomes dull and monotonous. A need for a target model which would simulate a more "true" to "life" picture was realised and a list of requirements drawn up. These were given to two RCEME technicians; S sgt Gumbley and Sgt DeWitte. They produced the present model in three months spare-time work (Figure 1).

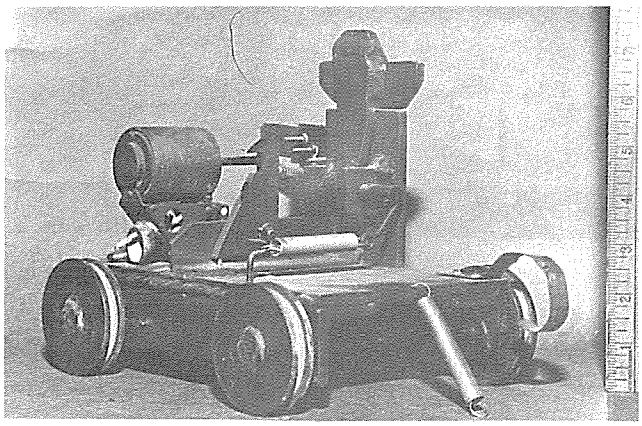
The model is a sand table scale of a generalized piece of "NWE" tank fighting country. Frontage is 14 feet and depth 32 feet. Scale buildings, road systems with convoys, defence works and a village are located to present "soft" and "HE" targets. Ten "hard" targets are tactically located to represent turret or hull down tanks. Each hard target can simulate the flash of main armament and can be controlled to represent a "pop-up" or surprise target.

Figure 3 shows detail of one of these hard targets. The solenoid, catch and return spring mechanism which controls "pop-up" can be seen. Behind the splash guard is the main armament "flash" bulb.

A moving "hard" target is located mid-distance in the sand table to run diagonally across the front. Powered by an electric motor-cable arrangement, it is a model railway system located below ground level with only the tank silhouette visible. Speed can be regulated from zero to maximum scale speed. Figure 4 shows rear 3/4 view of moving target and Figure 5 the electric motor-cable drive of the "mover".

Production of the model targets, although technically proficient, is overshadowed by a





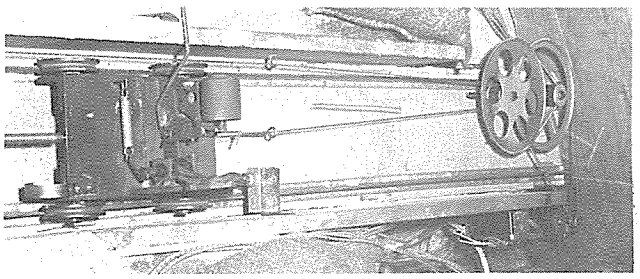


Figure 1 - Indoor Miniature Range

Figure 2 - Side View of 'Hard' Target

Figure 4 - Rear View of Moving Target

Figure 5 - Electric Motor-Cable Drive of the Mover

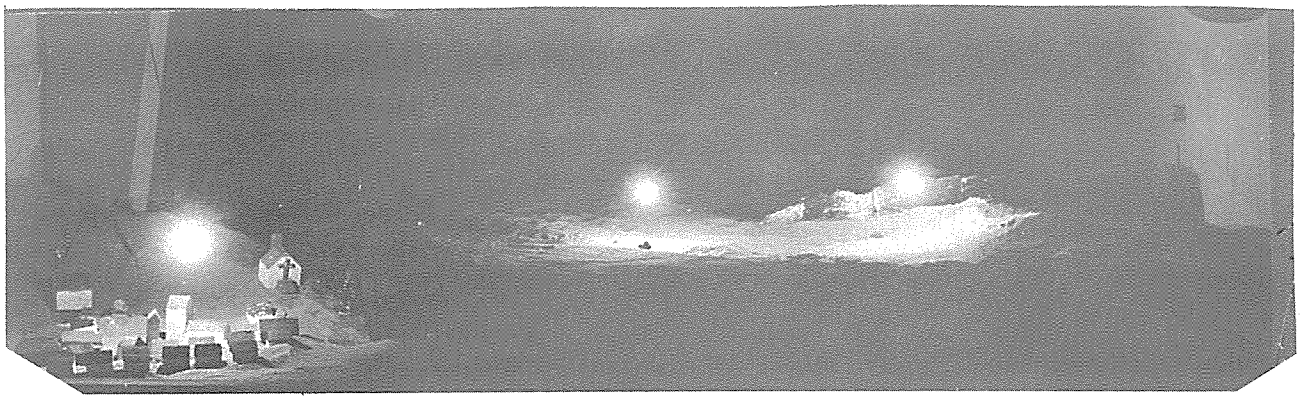
remarkable ability to control or vary the lighting of the model. Light conditions available:

a. "First Light" sunrise
b. Daylight
c. "Last Light" sunset
d. "Burning" village
e. Star Shell or Trip Flare (Figure 6)

Figure 6 shows the use of a star shell for illumination of the model. Lights and targets are controlled through a console located beside the tank (Figure 7). The console is the heart of the model. Here a series of switches, circuits, time delays and rheostats allows remote control over targets and lighting. Electrical power to run the model depends on the tank. (24 Volt) Cables connect the model to the console and slave receptacle of the tank. The tank electrical system is switched on and the auxilliary generator is run.

Console "breadboard" circuits and hard target are shown in Figure 8. In this picture S sgt Gumbley (left) and Sgt DeWitte (right) discuss production problems.

The "rube goldberg" of the model is the electric motor, cable and pulley drive for the "Star" shells. Two drive units control two sets of star shells (Figure 9). The star shells



are lighted bulbs (6 Watt) lowered by cable at a controlled rate and time for artillery shell duration (illumination duration 45 seconds).

From the console an IG (Instructor of Gunnery) can build target and lighting realism into training practices. Changes of lighting, taped playback of battle sounds with intelligent direction from IG allows for simulation of the battlefield. Full scope is given for checking of gunners accuracy and training crew commanders in observation and calling of fire. Target "hits" are recorded on a lighted number board located on the front of the model.

A high degree of technical proficiency and craftsmanship is evident in the detail and credit must go to S sgt Gumbley and Sgt DeWitte. Gumbley's electrical "expertise" was complemented by the excellent bench fitting of DeWitte.

Standard ordnance hardware and AWS material was used in construction. Special material was kept to a minimum and the training fund cost was under $50.

Production passed through three stages. These were:

Stage 1 – Bench making of targets, mover and "breadboard" of console.
Stage 2 – Framing range end, cross beams, plywood console and stand. Sand filling.
Stage 3 – Installation of targets, drives. Landscaping.

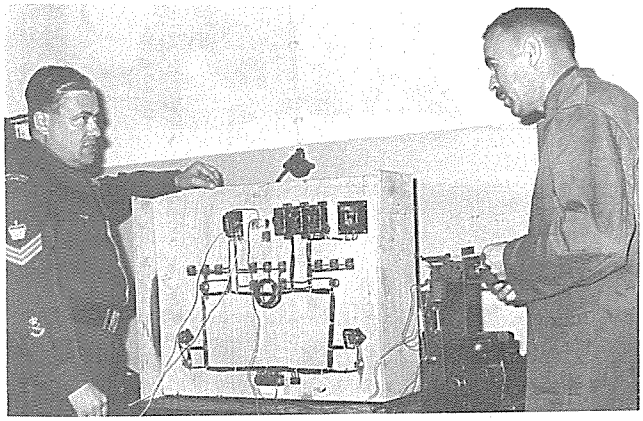
Improvements planned for the future are:

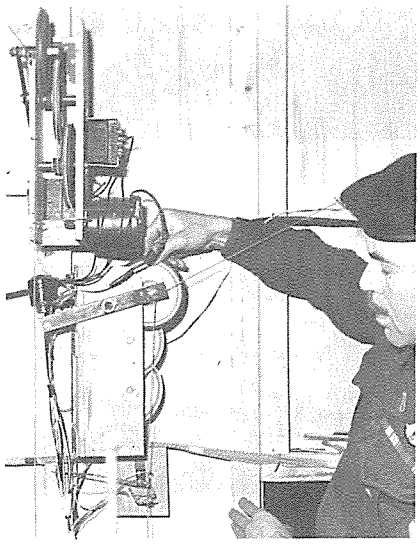
a. Better landscaping – More detail.
b. "Burning" village – A flickering light arrangement.
c. Infra-red simulation – A concentrated white spot of light from a tank searchlight to illuminate target with a difuse green filter over gunners sight.

Figure 6 - Use of Star Shell for Illumination of Model

Figure 8 - Ssgt Gumbley and Sgt De Witte with Console 'Breadboard' Circuits

Figure 9 - Drive System for Star Shells





MORE TECHNIC TEASERS

By Maj DH Curling

Here are some ingenious little mathematical problems for your "Technic Teasers" column of the Bulletin. None of these are original and have been taken from sources such as the Scientific American, Engineering Journal and other technical columns of the magazines that pass over my desk here at DRB. I personally found them to be entertaining and they do not require any mathematics – only a logical and methodical outlook.

(Because of the length of the answers supplied, it was possible to use only one of the problems in this issue. Others will follow in later Bulletins – Editor)

A Tour of the Moon

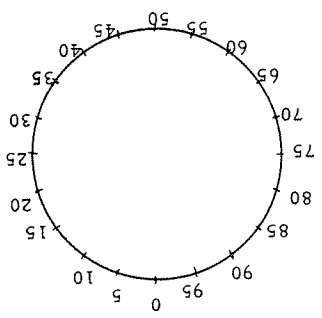
By the year 2000, a moon base has been established and an astronaut is to make an exploratory trip around the moon. Starting at the base, he is to follow a great circle and return to the base from the other side. The trip is to be made in a LEM (Lunar Excursion Module) 'bug' that is designed to travel over the satellite's surface. It has a fuel tank that holds just enough fuel to take it a fifth of the way around the moon. In addition the car can carry one sealed container of fuel which holds the same amount of fuel as the tank. This may be opened and used to fill the tank or it may be deposited, unopened on the moon's surface. No fraction of the container's contents may be so deposited.

The problem is to devise a way of making the round trip with a minimum of fuel consumption. As many preliminary trips as desired may be made, in either direction, to leave containers at strategic spots where they can be picked up and used later, but eventually a complete circuit must be made all the way around in one direction. Assume that there is an unlimited supply of containers at the base. The LEM can always be refueled at the base.

For problem II see the supplied diagram which cuts a great circle route into twentieths. Fuel used in preliminary trips must of course be counted as part of the total consumed. For example, if the "Bug" carried a container to point 90, left it there and returned to base, the operation would consume one tank of fuel. A straightforward procedure would be first to transport 41 containers to point 10, then carry a 42nd container to point 15 and return to point 10. This would consume 42 tankloads of fuel and bring 42 into play for a total of 84 all together. No more fuel is needed to complete the trip if proper back and forth trips are made. This total consumption of 84 tanks can be more than cut in half by better planning – which is the point of the problem. Many answers are possible. The best one that I have found circles the moon with a consumption of 23 tanks of fuel. Refer to the sketch in checking out the following steps:

1. In five trips, take five containers to point 90, return to base (consumes five tanks).
2. Take one container to point 85, return to point 90 (one tank).
3. Take one container to point 80, return to point 90 (one tank).
4. Take one container to point 80, return to point 85, pick up the container there and take it to point 80 (one tank).
5. Take one container to point 70, return to point 80 (one tank).
6. Return to base (one tank). This completes all preliminary trips in the reverse direction. There is now one container at 70, one at 90. Ten tanks have been consumed.
7. Take one container to point 5, return to base (half a tank).
8. In four trips, take four containers to point 10, return to base (four tanks).
9. Take one container to point 10, return to point 5, pick up container there and leave it at point 10 (one tank).
10. In two trips, take two containers to point 20, return to point 10 (two tanks).
11. Take one container to point 25, return to point 20 (one tank).
12. Take one container to point 30, return to point 25, pick up container there and carry it to point 30 (one tank).
13. Proceed to point 70 (two tanks).
14. Proceed to point 90 (one tank).
15. Proceed to base (half a tank).

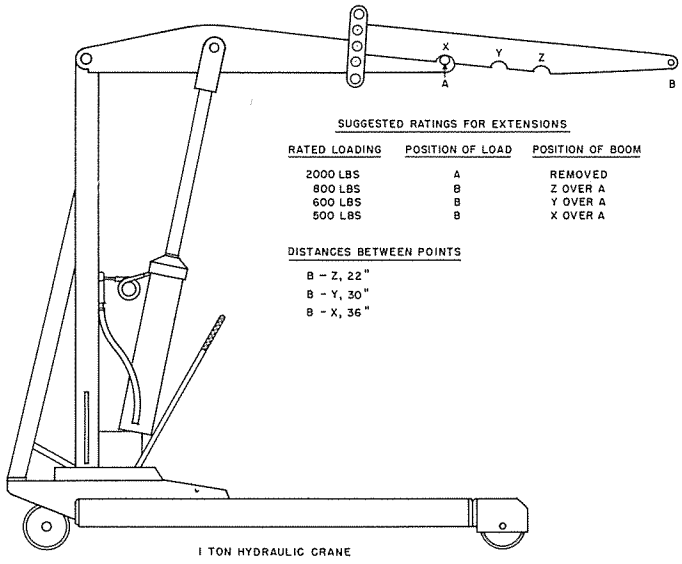
The car arrives back at base with its tank half filled. Total fuel consumption: 23 tanks. It takes a long time to describe the solution verbally but with the diagram in front it allows for a little straighter thinking.



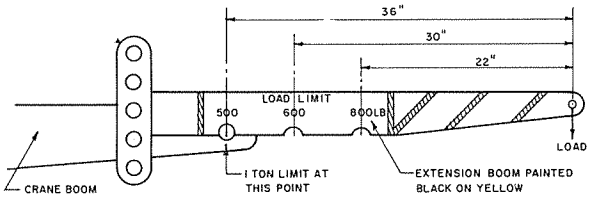
SAFE WORKING LOAD - BOOM EXTENSIONS

It has been brought to the attention of DEME by a suggestion forwarded to the Suggestion Award Committee that there may be boom extensions of hydraulic cranes that are not marked for maximum safe load capacities at the various points of extension. DEME Purchase Descriptions detail the requirement for these markings; however, earlier models and local pattern extensions may be affected.

It should be the concern of unit safety officers to ensure that the maximum safe working loads are clearly marked. The illustrations below are intended as a guide only.



1 TON HYDRAULIC CRANE



SUGGESTIONS RECEIVED

The following suggestions have been submitted by military or civilian personnel in the Corps. Some will be adopted and many will be 'shot down' for various reasons. However, they are the best evidence that RCEME people are constantly using their heads.

These files were received in DEME during the period April to July. The publication of the particulars here does not in any way imply their acceptability.

Suggestor	Suggestion
Mr EH Bell 204 B/W/Shop	Replacement 'Slave' receptacle
S sgt H Baillargeon 4 Coy	Clutch release bearing lub M62
S sgt RC Brimmage 2 Fd Wksp	Replacement tool
Mr Glen Johnson (2) 215 Wksp	Modification to Centurion pivot pins
	Modification to driver's seat
Mr HC Mussell DEME	Procuring of auto parts for Govt vehicles
S sgt H Noel DEME	Conversion of semi-trailer M172
S sgt RD Dunham 202 B/W/Shop	New method of repair to dosimeter
Mr Gaetan Martel 202 B/W/Shop	Modification of oscilloscope
WO2 JM Cunningham 4 Coy	Modification to Handset H5001 & 5003
Mr FH Dover-Masters 217 Wksp	Fusing of target mechanism Trainfire electrical
Mr WEM Allender (3) 204 B/W/Shop	Armature shaft holder Ferret generator
	Input shaft holder for Ferret generator
	New tubular wrench for Ferret generator
Cfn KC Royal	Modified hoist jacks

THE SPAN OF CONTROL ... ... IS THERE A LIMIT ?

By Capt RDL Connell, CD

The size of any organization is determined by two dimensions: the number of levels of command and the span of control. The wider one can make the span of control, the greater the worker/supervisor ratio. The more levels that are necessary, the greater the supervisor/worker ratio. Thus it is easily seen that the most efficient organization will maximize the span of control and minimize the number of levels of command.

The problem of a suitable span of control and its related delegation of authority existed as soon as one man had others working for him. Attempts have been made to determine mathematically how many men one person can control at the various levels of management. Four to eight subordinates have been suggested at the upper levels and eight to fifteen at lower levels. Urwick found "the ideal number of subordinates for all superior authorities to be four and at lower levels eight or twelve". Actual surveys of successful organizations show these to vary almost without limit. What then, causes some theorists to attempt to establish a mathematical limit to the number of subordinates which can be controlled effectively?

The factors which affect the span of control are the subordinate's training and ability; the task, its simplicity and rate of change; and the superior, his leadership and span of knowledge. These factors have been placed in order of importance. It is expected that this may meet with some opposition.

Training may be undertaken before a task is attempted or whilst "on the job". It is always related to the simplicity of the task insofar as it affects the span of control. An NCO in charge of a detail to sweep an area of refuse can easily control a hundred or more men. The training required to learn the job thoroughly is accomplished easily. The task is simple and repetitive. A group of untrained students under an NCO, suddenly required to produce articles on bench work is entirely a different picture. With a low training level and a difficult task, the span of control becomes greatly limited. As their training becomes effective or the work more repetitive, the span of control can grow.

The ability of subordinates to accept training must be a foregone conclusion. Trainees must be segregated early by ability or training resources are wasted. Only short-sighted managers delegate tasks beyond the ability of the subordinates.

Experience can be regarded simply as in-job training. As the job becomes repetitive with experience, the man then becomes better trained. This applies of course to all levels. Just as initial training makes the job simpler, on-the-job training or experience makes the job simpler. These two processes continue on, one after the other until the limit of ability is reached.

The span of control in the Sears Roebuck studies which saw thirty assistant managers under one manager is said to have been possible because the delegation of authority was forced on the manager by higher authority. However, without extensive training and the ability to accept the authority given, the task could not have been met.

The span of control in the Roman Catholic Church is perhaps the widest known span in any organization today. Some 750 line bishops (or archbishops) report directly to the Pope. The number of priests reporting to the bishops varies from about 80 to 1000. This again is due to thorough training of the priests and bishops and the characteristics of the task.

The training of subordinates includes interrelationship of personnel at their own level. The extent to which subordinates must consult each other depends on the teamwork required or the interrelationship of their tasks. The possible cross relationships have

been stated as placing a definite limit on the number of subordinates that one man can control. This is without foundation as no task requires complete teamwork between all members at their level in the organization. In other words, no task can be so complicated that every action of every person affects every other person at their level in the organization. Mathematically the possible combinations increase out of all proportions to what is experienced in our own sphere of activities. Koonz and O'Donnell list 5210 possible interrelationships between as few as ten subordinates. However, turning back to our refuse collectors, number two worker will have no reason to contact other than number one and number three and therefore the possible number of interrelationships decreases to a reasonable figure of two per worker. The probable interrelationships are something far less than this as the occasions for discussion of the task between these adjacent workers would be rare.

An example of a high rate of interrelationship is found in the building trades where electricians, plumbers, sheet metal workers and carpenters all affect each other's work simply because space is at a premium, each of their products has limitations as to location and two things cannot occupy the same space.

The probability of interrelationship does not therefore depend on the maximum mathematical possibility but is tempered by the extent of teamwork required and the frequency of the occasions when this teamwork is required. The communications required, of course, vary directly with the amount of interrelationship required.

Repetitiveness and simplicity of the task have a bearing on the permissible span of control. In the example of sweeping an area, the simplicity of the task makes it possible to have a wide span of control. Infantry section commanders with a continually changing task in battle can have only a very limited span of control. The repetitive nature of the tasks of ministers or priests allows a very large span of control in the organization of churches. The rate of change of the task in church organizations is very slow (10 - 100 years) and this of course simplifies the training problems. A piece of complicated equipment in RCEME becomes relatively simple to repair if it is not continually undergoing modification. Reliability of the equipment will then indirectly affect the span of control.

Leadership of the superior affects the span of control because leaders must be trained to lead by means of management training. The leader's span of knowledge must be wide. A leader's depth of knowledge is not as important. It is the worker who requires a depth of knowledge. Complexity of the task also affects the ability to exercise leadership. If the supervision is of simple tasks, or the training of the subordinates is thorough, then the span of control can be wide. A rapidly changing task can be met by thorough management training and the acceptance that rapid change is inevitable.

Better leaders cannot be substituted for lack of training of subordinates. When this occurs the manager spends his time training his personnel to do their basic task when he should be looking after only the problems. The maximum span is reached when management by exception becomes a reality.

Effective communication is one of the attributes of leadership of superiors. The effective use of communication is taught as part of management training. Communication is necessary at all levels but should not be confused with training. Remember, communication deals with what is to be done, training is how to do it: the greater the span of control, the fewer levels necessary for any given organization; the fewer the levels, the simpler the problem of communication.

The span of control then is dependent on the training of the individual, both the subordinate and the superior. The task limits the span of control according to its repetitiveness, its complexity and its rate of change. The leadership of the individual depends on his span of knowledge, much less on his depth of knowledge, and on his ability to use communications effectively to manage by exception.

A BETTER UNDERSTANDING OF THE TORQUE WRENCH AND ITS FUNCTION CAN BE AN EFFECTIVE TOOL IN THE ACCIDENT PREVENTION PROGRAM.

T-O-R-Q-U-E

Captain Jerry A. Simmons

VISUALIZE AN energetic young mechanic who has recently joined your unit — fresh from a unit that has the same type aircraft you are flying. Immediately the maintenance officer gives a sigh of relief; he is no longer worried about the fellow's technical ability. Then early one day the new mechanic was instructed to check the torque of the transmission bolts. Fine — this gives the chap a chance to go to the tool room and check out one of those shiny wrenches with the dials. After an hour of diligent work, he walks to the maintenance officer and says, "Sir, this bolt just broke." Just now everything is in a state of mass confusion because helicopter 1908 is scheduled for a flight at 0930 hours.

This and many other cases of improper use of all the all-important torque wrench has caused many aircraft to be grounded for repairs, new parts, or, in some cases, totally destroyed.

Shall we take a look at TORQUE and what it can do for us? Torque is based on the fundamental law of the lever: force times distance equals the moment or torque about a point.

The figure below represents a torque wrench. The arrow pointing downward at the handle of the torque wrench represents the force or pull which is exerted by the operator. The force or pull is designated as F.

The distance between the centerline of the drive square and the centerline of the force being applied at the handle is the lever length of the wrench, designated as L.

The curved arrow about the drive square of the torque wrench represents the torque which is being applied to the nut or screw. This is also the torque which is indicated on the dial of the wrench and will be represented as T_W.

To calculate the torque at the drive square it is necessary to multiply the lever length, L, times the force, F. This is shown in the following formula.

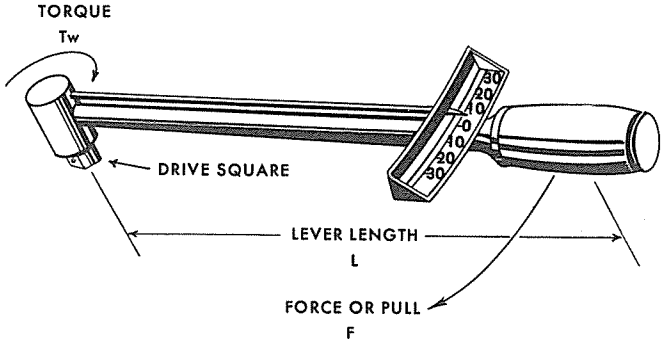
T_W = Torque
F = Force $\quad T_W = F \times L$
L = Lever length

The lever length L, of the wrench may be measured in inches or feet, whichever is desirable. Force, F, may be measured in pounds or ounces, but it is necessary to specify which unit of measure is used in making the calculation. If the lever length is measured in feet and the force in pounds, the torque developed should be referred to as foot-pounds.

Many parts have been improperly installed or torqued to the point of failure because an improper torque specification was used or torque conversion was not considered. It is often advantageous to change a torque specification from inch-pounds to foot-pounds. To do so, we must remember that the conversion is based on the fact that there are 12 inches to a foot; then it is evident that 1 foot-pound equals 12 inch-pounds. The following formulas may be written:

Ft.-Pounds x 12 = In.-Pounds
In.-Pounds ÷ 12 = Ft.-Pounds

Somewhere in my study of physics. I ran into Hooke's Law which meant absolutely nothing at the time. But taking another look with my newly acquired knowledge, based on Hooke's Law we can state that within its elastic limit the deformation of steel is proportional to the load to which it is subjected. This means that if a 1-pound load were placed on a spring and the spring deflected 1 inch, then the spring would deflect 2 inches if a 2-pound load were placed upon it, etc. The spring would continue to deflect 1 inch for each additional 1-pound until the stress reaches the elastic limit of the



steel. As long as the elastic limit of the spring is not exceeded, it will return to its original shape when the load is removed.

The measuring element of all torque wrenches in common use today employs one form or another of the principle of Hooke's Law.

The main purpose of torquing is to prevent cyclic loading and resulting metal fatigue. To accomplish this, it is necessary to produce a clamping force greater than the force tending to separate the joints or parts. Improper torquing presents various problems. For instance, under torquing permits cyclic loading which will result in metal fatigue, and overtorquing will strip threads and cause bolt failure.

The proper use of torque wrenches and torque specifications is of vital concern to every maintenance officer, pilot, and mechanic. It will require a good training program with constant supervision to ensure that torque wrenches are used properly. Another problem area is calibration. Needless to say, using an improperly calibrated torque wrench can be just as dangerous as not using one at all. During my last assignment, we found that torque wrenches turned in as unserviceable were being reissued as serviceable on the basis of a visual inspection. From this I would strongly recommend that each torque wrench be calibrated before use, with routine calibration inspections as required. (While the Army has no specific regulation on the torque wrench, AF TO 32B14-3-1-101 is widely authorized for use in determining calibration requirements).

No chain is stronger than its weakest link. So perhaps we should take a look at our operations to see whether we are able to answer these questions with a positive "yes."

Do all mechanics know how to properly use the torque wrench?

Do all mechanics know how to find torque specifications for required nuts, screws, or parts?

Do all mechanics know how to convert foot-pounds to inch-pounds or vice-versa?

Do all mechanics know the results of improper torquing?

Are torque wrenches being used as and when required?

Are torque wrenches properly calibrated and marked?

Are required torque wrenches on hand or on requisition?

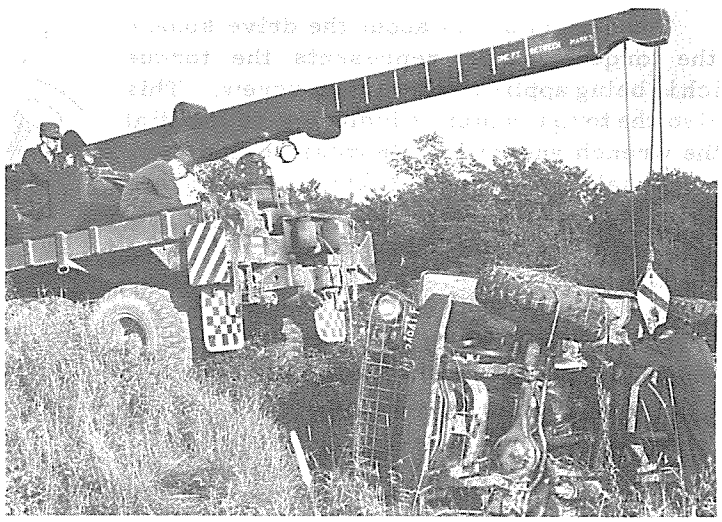
If these seven basic questions are answered "yes", we have taken a step in the right direction, but let us not forget that the torque wrench is an important instrument that can save time, material and, in many cases, lives.

- United States
Army Aviation Digest

COTC RECOVERY TRAINING AT RCEME SCHOOL

This truck was suspended several feet above ground in a tree so O/C WD Armstrong (centre) cut a limb from the tree to permit the truck to be swung free. At lower left is O/C PB Carroll. -Photos by Thomas

These three COTC cadets are righting an overturned truck in the RCEME School training area; l to r: O/C JN Turcotte, O/C GT Tetanish and O/C RG St Aubin.



Technical Notes

The following technical notes, consisting entirely of General Motors of Canada Products Service Bulletins, are put in as back pages which may be removed for easy reference, if desired.

OIL LEAKS BETWEEN REAR AXLE PINION SHAFT AND COMPANION FLANGE - 1964 Series 1000 Sedan

Oil leaks from the rear axle pinion on the above models may be due to leakage between the pinion shaft and companion flange, rather than past the companion flange seal. This joint is sealed in Production with a sealer.

If leaks are experienced in the Field, they may be repaired by removing the nut and washer, using the procedure for pinion flange replacement, and applying a non-hardening sealer (G. M. Gasket Paste), as shown in Fig. 31.

It is also recommended when the companion flange is removed for any axle repairs that sealer be applied on reassembly of parts. Current Shop Manuals should be corrected to include this sealing operation.

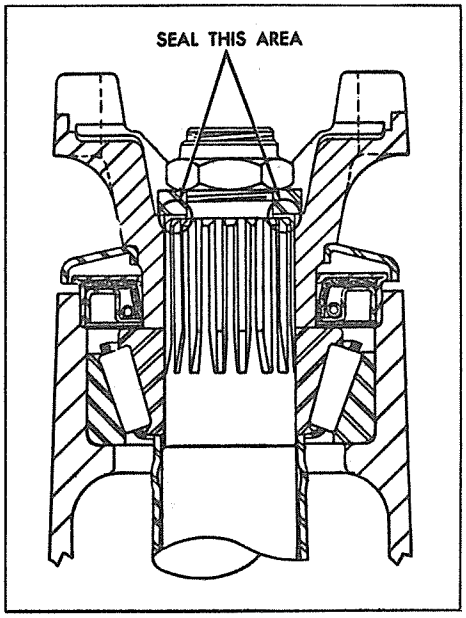


Fig. 31.

DOOR LOCK INSIDE REMOTE CONTROL - 1964 Chevrolet Truck Series 10-80

This item is in addition to the information issued on Page 3 of the 1964 Product Service Bulletin, this Section, dealing with "Doors Locking Involuntarily When Slammed", advising that a new design remote control has been developed to correct this condition and entered Production approximately April 11th or at the following vehicle identification number.

Chevrolet Truck 4C6803816057E

At the same time the inside door handle position will revert from the presently released near vertical position to the horizontal position, which was the original 1964 position.

The new design remote control, part #3860601 and 2, will supersede the originally released remote control, part #3794789-90, as a service replacement part.

BODY MOUNTING CUSHION CHANGE - 1964 Chevrolet Sedan Series 1000

During early Production a condition was being experienced where the #1 body mounting cushion would shift during assembly and when the body was dropped on the frame and the mounting bolt installed and tightened, the cushion insert would cut into the upper cushion resulting in a metal to metal contact between the insert and the frame bracket and a creaking noise when operated under certain driving conditions.

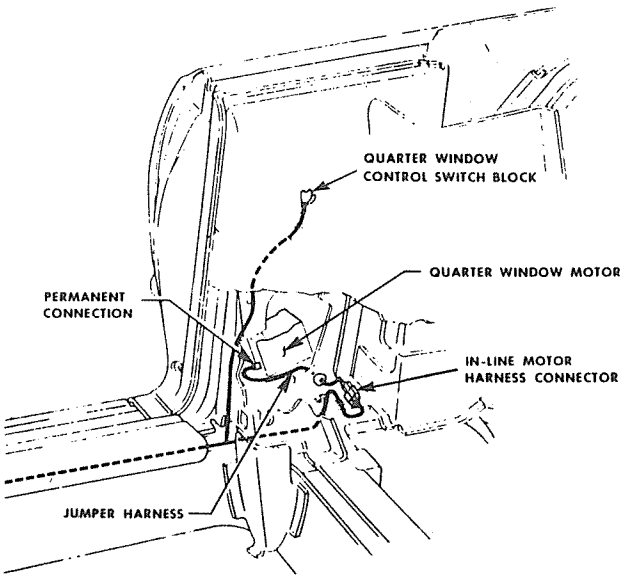
To correct this condition a change has been made to the #1 mounting bracket, which is welded to the frame side rail, increasing the size of the hole to accept a larger diameter body cushion, part #3857025. This change commenced in Production at vehicle identification number 411110-52513 for all models except convertibles.

To install the new larger body cushion on prior built jobs in the Field it will be necessary to ream out the hole in the mounting bracket 3/32" that is from 1-13/64" to 1-19/64" diameter, to accept the insert area of the cushion. This recommendation will also apply on past models which use cushion, part #3772258, at the #1 mounting bracket.

WINDSHIELD WIPER BLADE REPLACEMENT DUE TO IMPROPER WIPE - 1964 All Car Lines

Investigation into a condition of improper windshield wiper cleaning of the windshield glass has been found, in a great number of cases, to be due to a very small amount of windshield sealer having become lodged on the tip of the rubber insert of the wiper blade.

It is therefore recommended that before replacement of wiper blades is considered, a close inspection be made and any windshield sealer present, removed from the length of the tip of the blade inserts, using a suitable solvent.



1964 "B" BODY

Fig. 77.

RUBBER WEATHERSTRIP LUBRICANT - All Car Models

The current trend of body design results in increased use of rubber sealing. This is particularly pronounced in all hardtop styles.

With the increase of rubber weatherstrip and sealings, quite a number of squeaks are encountered around the various areas where there is a movable contact with rubber. This condition is considerably aggravated during the cold months of the year and does present an annoying situation as far as the customer is concerned.

There is no need for such conditions to continue to exist, providing the rubber is carefully lubricated with the recommended rubber weatherstrip lubricant at intervals of every six to eight weeks. The frequency would only be required during the cold months, whereas a thorough lubrication every two or three months during the summer is usually sufficient.

In addition to applying this lubricant for the prevention of squeaks, it may also contribute great-

ly to the ease of opening and closing of doors, especially hardtop models, and also the opening of trunk lids.

There are various types of lubricants on the market which may do a satisfactory job as far as lubricating is concerned, but may be detrimental in some other way. Therefore, in order to assure ourselves of having a high grade rubber lubricant that is clean and non-staining, as well as being compatable with the car finish, we have available through your local Parts Warehouse, a lubricant that meets with all these qualifications and which is released under part #5798277 (pint) or #5722055 (2 ounce bottle), Rubber Weatherstrip Lubricant. We strongly recommend that this material be used, wherever a rubber lubricant is required, in order to avoid unforeseen future problems.

AIR CLEANER ELEMENT WING NUT OMITTED - 1964 Series C60, C80, C960 and C980 Equipped With 348 and 409 Engines

A few of the above series Trucks built prior to vehicle identification #4C8203815922G may not have the air cleaner element wing nut installed.

Trucks built prior to the above vehicle identification number should be checked for this wing nut, shown in Fig. 40, whenever the air cleaner is removed for service.

The wing nut is available for Service under part #219281.

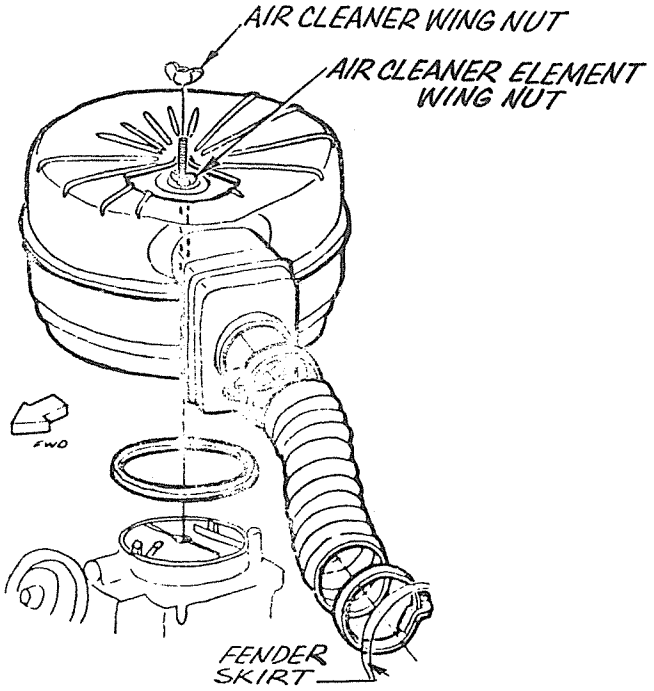


Fig. 40.

FUEL PUMP ATTACHING BOLT HOLES LEAKING CRANKCASE OIL -(1964 Series 10 through 60 and Series 910 through 960) Trucks Equipped With 4 and 6-Cylinder In-Line Engines

A few complaints have been received of engine oil leaking around the fuel pump attaching bolts on the subject vehicles. Oil leaks from this location may be corrected by removing the bolts, coating the threads with GM Perfect Seal Sealing Compound and re-installing the bolts.

Dealer's copies of Maintenance Manuals should be corrected to show the use of GM Perfect Seal Sealing Compound on the fuel pump attaching bolts.

Note: - GM Perfect Seal Sealing Compound is available from Parts Warehouses under part #5789226, for 4-ounce cans and part #987266, for 16-ounce cans.

INCREASED REAR AXLE OIL CAPACITY - 1960-64 Trucks Equipped With Eaton Axle

To improve the durability of the subject axles, the lubricant capacity has been increased by raising the oil filler hole in the rear axle cover.

The new axle covers can be identified by either a ring of yellow paint around the filler hole, or by the height of the filler hole, as shown in Fig. 38.

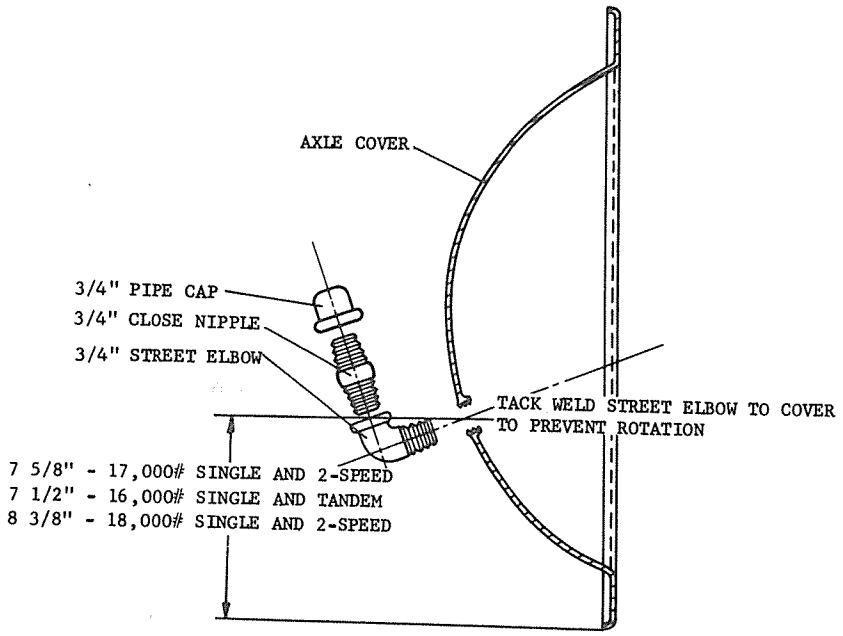

AXLE COVER
3/4" PIPE CAP
3/4" CLOSE NIPPLE
3/4" STREET ELBOW
TACK WELD STREET ELBOW TO COVER TO PREVENT ROTATION
7 5/8" - 17,000# SINGLE AND 2-SPEED
7 1/2" - 16,000# SINGLE AND TANDEM
8 3/8" - 18,000# SINGLE AND 2-SPEED

Fig. 38.

In the event that a lubricant level increase is desired on an axle incorporating an early design cover, the level can be increased by installing a standard 3/4" pipe street elbow, close nipple and pipe cap in place of the filler plug, as shown in Fig. 38.

THREE-SPEED TRANSMISSION GEARSHIFT LEVER RATTLE - 1963-64 Series Sedan 1000 Equipped With Synchro-Mess Transmission

A new shifter tube assembly, designed to eliminate lower shifter tube gearshift lever rattle, is now being used in both Production and Service on the above models. The new shifter tube assembly, part #3851747, entered Production at approximate vehicle identification #41847035953.

Should gearshift lever rattle be encountered on 1963 models or 1964 models built prior to the above vehicle identification number, it may be corrected by installing one wave washer, part #3793124, between the first and reverse shift lever and the adjusting ring assembly, as shown in Fig. 24. The wave washer may be installed as follows:

1. Remove the upper steering shaft stop clamp.

2. Remove two gearshift lever adjusting ring retaining bolts.

3. Slide the adjusting ring down the steering shaft.

4. Cut the wave washer with a chisel so that it may be installed over the steering shaft. Coat washer and shift lever with lubriplate.

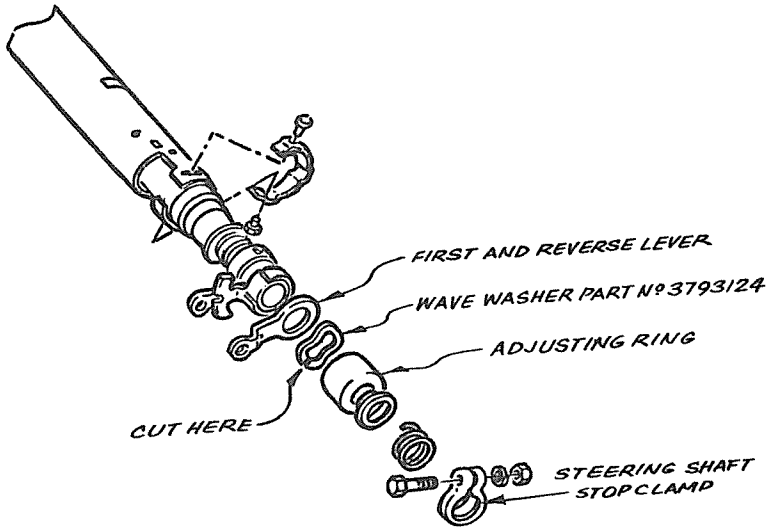


Fig. 24.

5. Install the wave washer over the steering shaft and slide over the end of the shifter tube and position next to the first and reverse lever.

6. Slide the adjusting ring into position and install the retaining clamp and screws.

7. Rotate the adjusting ring so that tension is applied to the first and reverse lever and lock in this position. Check for binding of the shift lever and reduce tension if necessary.

8. Check and correct if necessary, the upper gearshift lever housing end play adjustment.

The flat rate time allowance to install the wave washer and adjust the gearshift lever housing end play is .4 hours labour. Authorization will not be required when making this correction.

UNIVERSAL WATER PUMP UNIT, PART #3848072 - All 265, 283 And 327 Cubic Inch V-8 Engines Used On Trucks

The following information supersedes all previously published instruction sheets and those installed in the subject pump unit prior to April 15th, 1964. Revised instruction sheets will be dated in the future.

The pump assembly, included in this universal pump unit, includes provision for two different by-pass systems. Either system allows a flow of water to continue through the system in event of thermostat failure.

A. Passenger Models - 3/8" Internal By-Pass System (has 3/8" by-pass hole located in the right hand pump body flange)

1. Discard the 3/8" dowl pin, part #141242.

2. Order and install a 3/4" pipe plug, part #103869, in the 3/4" external by-pass hole in the upper surface of the pump housing body, shown at "A" Fig. 37.

B. Truck Models - 3/4" External By-Pass System (has 3/4" tapped hole located on the upper surface of the pump housing body)

1. On Truck models originally equipped with 1/2" by-pass system, it is necessary to install reducer bushing, part #144042, (reduces opening 3/4" down to 1/2").

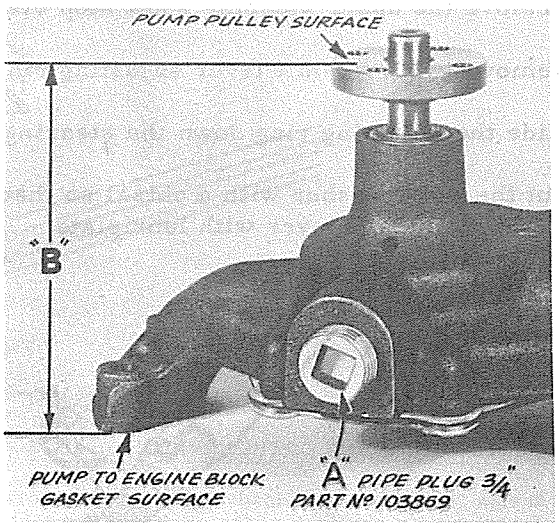


Fig. 37.

2. Plug 3/8" internal by-pass hole with 3/8" dowl pin, part #141242, included with this unit.

When installing this pump unit, it may also be necessary to perform the following operations:

C. 1955-56 Models - Install reducer bushing, part #3138803, in heater hole outlet (reduces 3/4" down to 5/8")

NOTE:- To maintain pulley and belt alignment, it is recommended that the relative position of the original pump pulley hub, to the engine block, be checked, as shown at "B" Fig. 37, and the new pump hub be positioned accordingly.

It will be necessary to remove the pump back plate to permit supporting of the pump bearing shaft while pressing on the hub.

TRANSMISSION CONTROL LEVER SHAFT REVISED - 1964 Series G10

The transmission control lever shaft on the above series Trucks has been revised to increase strength and eliminate the possibility of twisting the shaft. The new shaft, shown in Fig. 39, is reduced in outside diameter from 11/16" to 5/8" and has the wall thickness increased from .070"-.088" to .078"-.094".

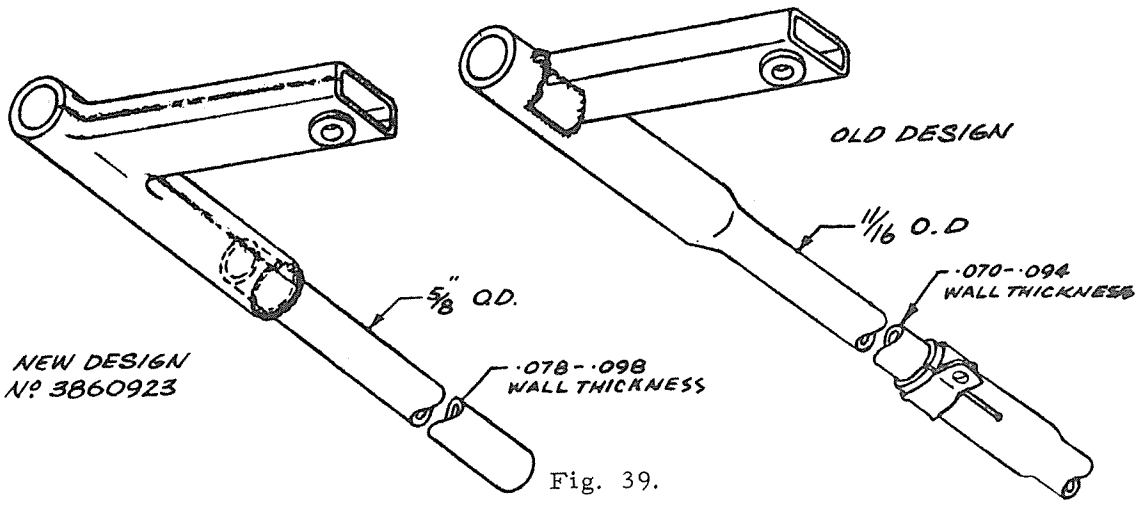


Fig. 39.

This change entered Production at the following vehicle identification numbers:

Transmission	Vehicle Identification Number
Series G10 - 3-Speed	4G1205600851A
Series G910 - 3-Speed	4G91275600632A

NEW CLARK FIVE-SPEED TRANSMISSIONS - 1964 Series 60 Trucks Equipped With 327 and 348 Cubic Inch Engines

New Clark Five-speed standard ratio (model 2653V) and close ratio (model 2622V) transmissions have been used in Production on the above model Trucks since approximately April 15th, 1964. The new transmissions are similar to the 265V and 267V Clark transmissions which they replace but have increased torque capacity and provide more desirable gear ratios.

Transmission identification remains on the left rear face of the case, near the power-take-off cover. Although the source date code remains unchanged, the transmission identity code has been changed to conform with the new model numbers, as shown in the following chart:

	Standard Ratio		Close Ratio	
Model	265V	2653V	267V	2622V
Code	5V	53V	7V	22V

The ratios of the new model transmissions have been changed and are compared with the old model transmission ratios in the following chart:

	Standard Ratio		Close Ratio	
	265V	2653V	267V	2622V
First	7.58	7.08	6.06	7.08
Second	4.38	4.08	3.50	4.08
Third	2.40	2.23	1.80	2.10
Fourth	1.48	1.46	1.18	1.17
Fifth	1.00	1.00	1.00	1.00
Reverse	7.51	6.73	6.00	6.73

Many parts are interchangeable between the new and old transmissions. The following chart lists only those parts which differ and also includes Clark casting numbers for part identification.

Standard Ratio

265V		2653V		
GM Part Number	Clark Part Number	GM Part Number	Clark Part Number	Part Name
3782729	281401	3854498	282084	Transmission and Brake Assembly
3787159	215737	3859667	219701	Gear - Clutch (Main Drive)
2337360	220271	3859669	220253	Gear - Transmission Driven Counter
2337366	220278	3859670	220522	Gear - Transmission Mainshaft Fourth Speed
3760666	220272	3859668	220252	Gear - Transmission Fourth Speed Counter
3760667	222601	3859664	219399	Gear - Transmission First & Second Speed Counter
2337362	220274	3859663	215803	Gear - Transmission Reverse Idler

Close Ratio

267V		2622V		
GM Part Number	Clark Part Number	GM Part Number	Clark Part Number	Part Name
3782731	281403	3854499	282083	Transmission and Brake Assembly
3787158	215736	3859667	219701	Gear - Clutch (Main Drive)
2337365	220277	3859669	220253	Gear - Transmission Driven Counter
2337366	220278	3859665	219409	Gear - Transmission Mainshaft Fourth Speed
3760666	220272	3859666	219410	Gear - Transmission Fourth Speed Counter
3760667	222601	3859664	219399	Gear - Transmission First and Second Speed Counter
2337362	220274	3859663	215803	Gear - Transmission Reverse Idler
2350873	220191	2350871	220255*	Assembly - Transmission Fourth and Fifth Speed Clutch and Synchronizer

* 2350871 Synchronizer is currently used in the standard ratio version only.

FRONT DOOR JAMB SWITCH OPERATION - 1963-64 Chevrolet Series 1000, 1963-64 Corvair Series 600-700-900 And 1964 "A" Bodies

Due to the high frequency of door jamb switches being replaced, this item is being released to outline conditions which may be experienced and corrective steps which should be taken.

Condition 1: The front door jamb switch sleeve, as shown in Fig. 81, may become loose and cause intermittent operation.

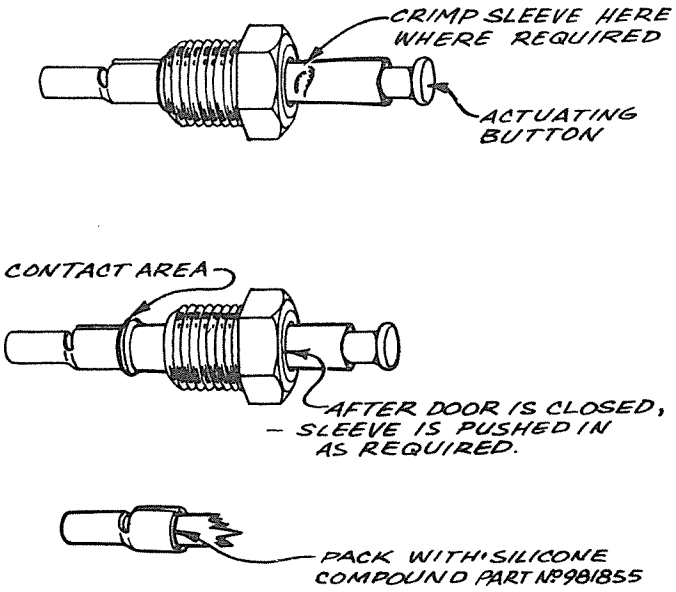

CRIMP SLEEVE HERE WHERE REQUIRED
ACTUATING BUTTON
CONTACT AREA
AFTER DOOR IS CLOSED, SLEEVE IS PUSHED IN AS REQUIRED.
PACK WITH SILICONE COMPOUND PART Nº 981855

Fig. 81.

Correction:- Leaving switch in pillar, pull the loose sleeve fully rearwards and, using a pair of standard type pliers, crimp the sleeve in the area shown in Fig. 81. Upon re-closing of door, the switch sleeve will tighten and be pushed in sufficiently to provide correct adjustment.

Note:- When performing door alignment operations, there is a possibility that the front door jamb switch may become inoperative (dome and/or courtesy lights will remain on), if the door is adjusted rearwards in the door opening for a distance of more than 3/16". In this event, perform the above outlined operation to correct.

Condition 2: Front door jamb switch may become inoperative due to dirt and corrosion at the contact area. In the majority of cases, the switches may be repaired as outlined below.

Correction:- 1. Disconnect negative battery cable.

2. Remove switch as follows. Using a pair of standard pliers, hold the actuating button, shown in Fig. 81, to prevent the actuating rod and electrical wire from turning, and remove switch and disconnect wire.

3. Depress actuating button and clean dirt and corrosion off of contact area, shown in Fig. 81, and pack the contact area of the terminal with Silicone Compound, part #981855.

4. Re-install switch by reversing the removal procedure.

5. Re-connect battery negative terminal.

TYPICAL POWER-TAKE-OFF INSTALLATION INSTRUCTIONS - All Power-Take-Off Installations - Trucks

Reports of noise and misalignment conditions have been received after Field installation of power-take-offs because of the following reasons:

1. Insufficient clearance between the transmission P. T. O. driving gear teeth and the P. T. O. driven gear teeth which causes a whine in the gears.

2. Excessive backlash between these gears may cause rattling of the gears.

3. Use of cap screws or studs other than those designed especially for P. T. O. installation could cause misalignment of the gears and the P. T. O. unit.

4. Other installation errors which could result in a combination of these conditions.

Whenever a manufacturer's recommended P. T. O. unit is installed, their installation procedures and the P. T. O. load rating must be rigidly adhered to. Particular attention must be given to the information contained in the INSTRUCTION section of this item to insure satisfactory P. T. O. operation.

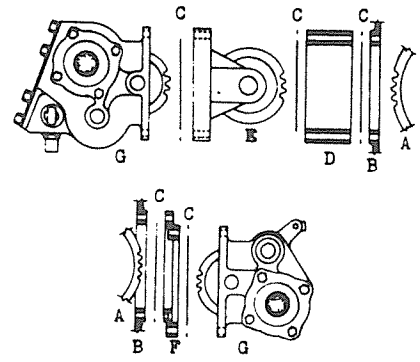
Instructions

1. To assemble the complete power-take-off unit (which may include an adapter plate, adapter gear assembly, or filler block along with the required number of gaskets) to the transmission, thread the coarse end of the P. T. O. manufacturer's recommended studs or cap screws all the way into the transmission aperture pad, shown at "B" Fig. 31. The manufacturer's stud and cap screw kits must be used since the critical diameter, length, and hardness specifications insure correct gear mesh and proper alignment of the P. T. O. unit with the transmission opening. Be sure to tighten all stud nuts or cap screws evenly and firmly.

2. To be sure that the backlash between gears, shown at "A" and "G" Fig. 31, is approximately correct, distribute the correct number of gaskets, shown at "C" Fig. 31, between all mounting parts as specified in the P. T. O. manufacturer's installation instructions.

3. After the unit has been assembled, the backlash between the transmission's P. T. O. driving gear and the P. T. O. driven gear must be checked to be sure that it is within the manufacturer's specifications of .008" to .012". To check the backlash, it can be measured with a dial indicator by removing the transmission cover, holding the P. T. O. driving gear in the transmission, and rotating the P. T. O. driven gear by hand.

   If the unit whines in operation, the backlash is probably less than .008". Too little gear backlash causes high separating forces between the gears and may in turn cause P. T. O. or transmission case breakage. If the installation has insufficient backlash between gears "A" and "G", shown in Fig. 31, add one or more gaskets until specified backlash is obtained.



A - Transmission P.T.O. Driven Gear
B - Transmission Aperture Pad
C - Gaskets - As Req'd.
D - Filler Block
E - Adapter Gear Assy.
F - Adapter Plate
G - Power-Take-Off Gear

Fig. 31.

Rear View of Two P. T. O. Applications

If the P. T. O. drive and driven gears rattle in operation, the backlash is more than .012". Too much backlash means there is insufficient tooth contact area. This causes excessive pressure and may result in tooth breakage on the P. T. O. driving or driven gear. If the installation has too much backlash between gears "A" and "G", shown in Fig. 31, remove one or more gaskets to obtain the correct gear backlash.

4. To determine the P. T. O. propeller shaft maximum normal operating angle (the angle between the propeller shaft and the shafts of the P. T. O. output and the driven unit's input, Fig. 32), the angles in both the plan (top) view and elevated (side) view must be determined.

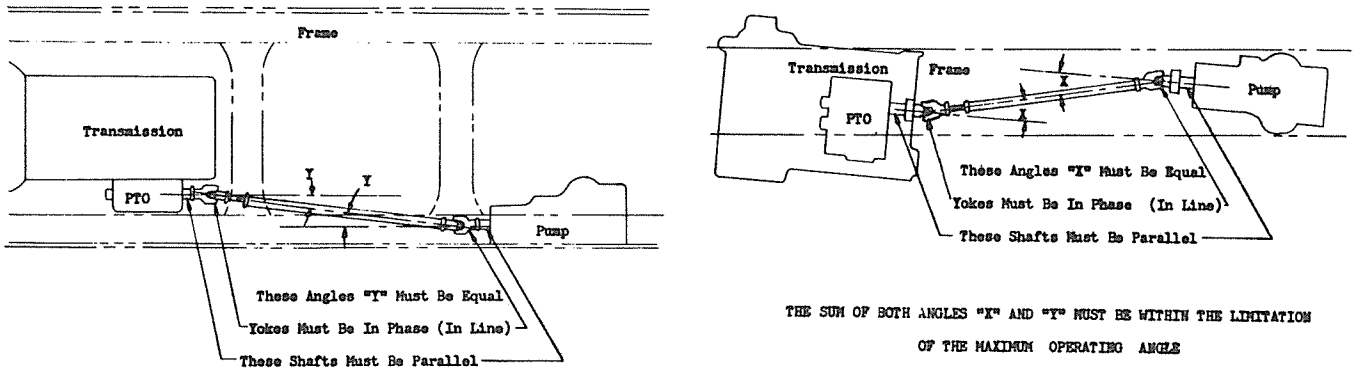


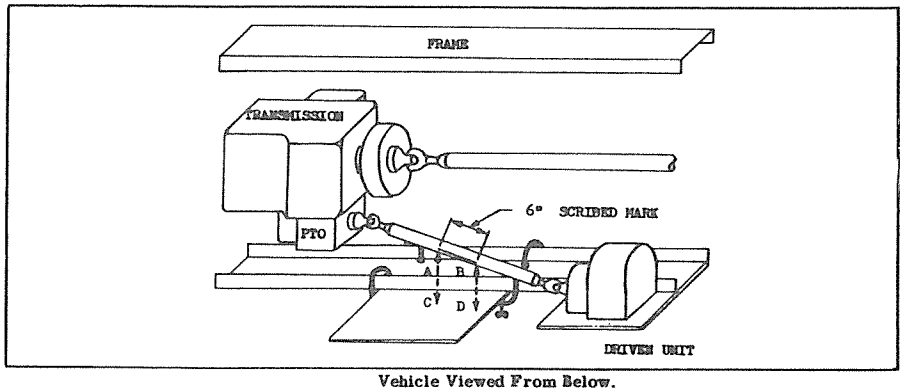
Fig. 32.
A Typical P. T. O. Installation Showing Design Limitations

To determine the side view angles, shown at "X" in Fig. 32, the P. T. O. driven unit must be installed so that its input shaft is parallel to the driving P. T. O. output shaft. Then the side view angles "X" can be measured by using a bevel protractor and subtracting the engine angle from the angle of the P. T. O. propeller shaft. These angles "X" should be equal.

The top view angle, shown at "Y" in Fig. 32, can be measured by first drawing six inch line at any point on the P. T. O. propeller shaft parallel to the propeller shaft centreline. Then measure the perpendicular distance from the two end points of this line to the frame or any vertical plane section such as a board which is clamped parallel to the frame, shown in Fig 33. The difference between these two distances "AC" and "BD" can be converted into an angle. When the difference falls between the values on the following chart, the next highest value should be used.

Measured Difference	Angle
0. 25	2° 30'
0. 50	5° 00'
0. 75	7° 30'
1. 00	10° 00'
1. 25	12° 30'
1. 50	15° 00'
1. 75	17° 30'

To determine the maximum normal operating angle, add the angles in both the plan (top view) and elevated (side view) planes.



Vehicle Viewed From Below.

Fig. 33.

Depending on the P. T. O. propeller shaft speed, the power-take-off driven unit must be located to insure that the propeller shaft operating angle will fall within the limit of the maximum operating angle according to the following chart. This is necessary to keep vibration to a minimum.

P. T. O. Propeller Shaft - R. P. M.	Maximum Normal Operating Angle
1000	15° 00'
1500	13° 00'
2000	10° 00'
2500	8o 30'
3000	7° 00'
3500	6° 00'
4000	5° 00'

Example: The side view angle "X" was measured with the bevel protractor to be 7° 00'. In the top view, AC = 6.00" and BD - 5.40" resulting in a difference of .60". Taking the next highest reading on the chart, the reading then becomes .75 which represents 7° 30'.

The normal operating angle then is the sum of "X" and "Y" or 14° 30'. The nearest angle on the chart is 15° 00' which represents a maximum P.T.O. output speed of 1000 R.P.M. This speed of 1000 R.P.M. should not be exceeded by the P.T.O. drive shaft at any time.

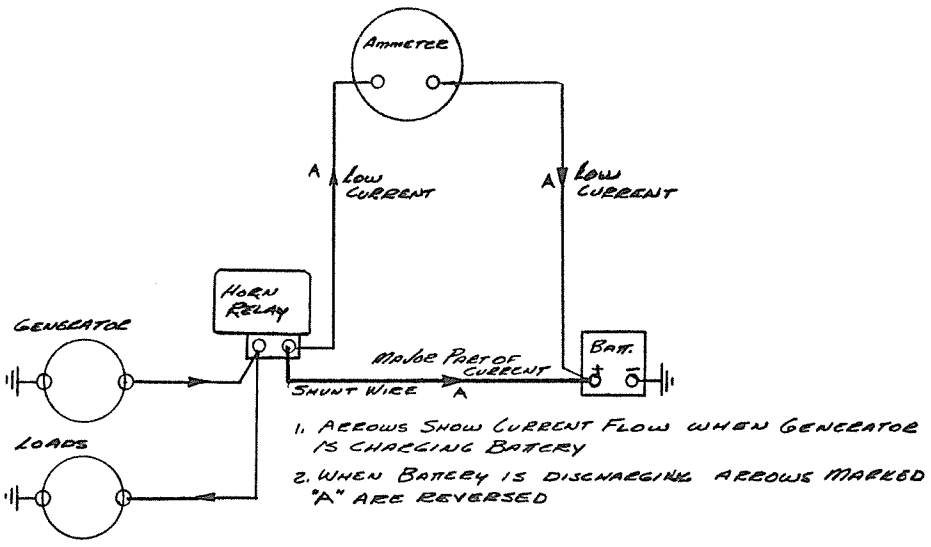
5. The propeller shaft yokes must be in correct phase (in line) to eliminate the resulting vibrations due to the characteristics of the variable speed universal joint, as shown in Fig. 32.

AMMETER PROTECTION - All Chevrolet Trucks Equipped With Ammeter

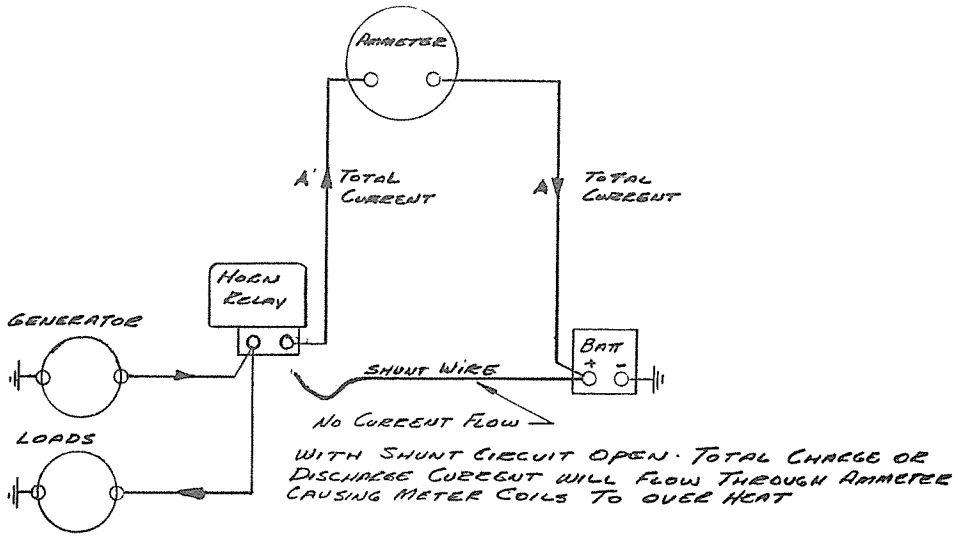
The purpose of this item is to warn Dealers' Service personnel of the potential danger to the ammeter in the above vehicles if certain precautions are not taken when performing electrical repairs.

These ammeters are a shunt-type in which the major portion of current flow is through the shunt wire, and a very small proportionate current flows through the ammeter coils to indicate current flow. This shunt wire is a heavy wire running from the battery positive terminal across the vehicle under the upper radiator support to the battery terminal of the horn relay.

If the shunt wire should be disconnected from the horn relay and the generator operated or any electrical load connected, all the current would have to flow through the ammeter coils, with the danger of exceeding the capacity of the coils and causing them to burn out. Refer to Fig. 34 for representative circuits showing current flow in each case.



NORMAL CIRCUIT WITH WIRES IN PLACE



CIRCUIT WITH SHUNT WIRE OPEN

Fig. 34.

In order to prevent such damage, the wires should never be removed from the horn relay without first disconnecting the battery.

ARMY VEHICLE ACCIDENTS LOWER

There was a general decrease in Army vehicle accidents in 1963, Army Headquarters has announced. Driving a total of more than 58 million miles in Canada and Europe – 200,000 more than in 1962 – Army drivers had 1411 accidents compared rate for 1963 was 2.46 per 100,000 miles against 2.59 in 1962.

The number of soldiers injured increased during the past year – 47 compared to 26 in 1962. Deaths, however, decreased from 12 to eight.

Soldiers also had fewer accidents causing injuries driving their private cars than previously. Reported casualties totalled 115, including 32 fatalities, 26 serious injuries and 57 slight injuries.

In 1962, 43 soldiers died in private auto accidents, 29 were seriously injured and 73 slightly injured. No record is kept of private car accidents where there is no injury.

The Army conducts year-round safe-driving campaigns for its soldiers driving both military and civilian vehicles.

– Canadian Army Public Relations

EDITORIAL (continued from page 1)

be anticipated in the change-over. Although the concept of this 10-year plan appears revolutionary, its implementation will of necessity be evolutionary. I believe that it will provide incentive and a challenge to the younger soldier. I know that the Army will, as usual, react as it always has with vigour and dispatch, and will make the new organization as effective as possible as soon as possible.

I am putting these thoughts on paper so that all ranks will understand the purpose of this 10-year plan and will be in a position to answer any queries that may be received from outsiders.

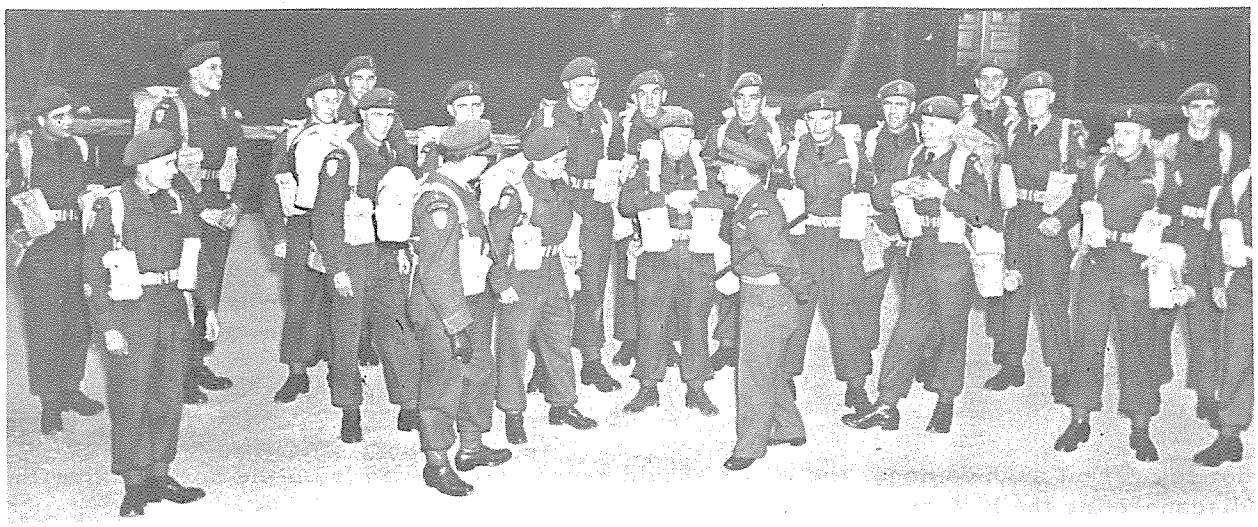
I hope in the near future to be able to visit our larger garrisons to explain personally the plans which are being made within the Army to play our role in the future organization and to explain the decisions which are being made as the overall plan develops.

- Canadian Army Journal

FLASHBACK - RCEME , TOO

In "Flashback No 44", the Canadian Army Journal (Vol XVIII No 1), reveals the story of Canadian units going to Europe in 1951 as part of NATO "collective defence". While carefully listing the various infantry, artillery and armoured units; the RCE, the RC Sigs, RCASC - RCEME was omitted.

To set the record straight, the advance party of 194 Workshop, RCEME, left Kingston on 30 Sep 1951. The main party sailed from Quebec 12 Nov 51. The advance party arrived in Hamburg 14 Oct 51, going from there to Hannover to set up the workshop and prepare for the arrival of the workshop and Major GL Lodge, the CO.



Major Lodge, CO 194 Workshop, right, wishing Capt Tod Sloan and his advance party bon voyage from the RCEME School.

Men of 194 Workshop embarking for Europe at Quebec.